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U.S. DEPARTMENT OF COMMERCE
Environmental Science Services Administration
Federal Coordinator for Meteorological Services and Supporting Research

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN

FCM 70-1

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U. S. DEPARTMENT OF COMMERCE

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

Federal Coordinator for Meteorological
Services and Supporting Research

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Supersedes National Severe Local Storms
Operations Plan - 1969

Washington, D. C.
January 1970

PREFACE

This is a National Plan outlining the responsibilities of the various U.S. agencies which provide meteorological services in observing and forecasting severe local storms. Facilities of the Department of Commerce, the Department of Defense and the Department of Transportation are integrated into a joint effort designed to reduce the damage and minimize the casualties resulting from these storms.

This National Severe Local Storms Operations Plan supersedes the 1969 version. It is issued in loose-leaf form so that future revisions can be made by page changes. The total Plan will be reissued every 5 years.

Robert M. White
Federal Coordinator for Meteorological
Services and Supporting Research

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1.0. RESPONSIBILITIES OF COOPERATING AGENCIES

1.1. ESSA Weather Bureau.

1.1.1. General. Although the ESSA Weather Bureau has the statutory responsibility for providing a severe local storm warning service for all 50 States, the extremely low frequency of severe local storms in Alaska and Hawaii does not justify establishment of a similar service for these States.

This warning service is for use by the general public and general and commercial aviation, and is provided through the National Severe Storms Forecast Center (NSSFC) in Kansas City, Mo., local Weather Bureau Offices (WBO); and Flight Advisory Weather Service (FAWS) Units at Weather Bureau Forecast Offices (WBFO). The functions of these various units follow.

1.1.2. National Severe Storms Forecast Center (NSSFC).

1.1.2.a. A continuous watch on the possibility of severe local storm development in the conterminous United States will be maintained at all times. Any special rawinsonde, pibal, and other weather observations needed during the course of this watch are authorized and will be requested in accordance with special instructions. The NSSFC will arrange for the entry of all upper air observations received by them on all internal Weather Bureau RAREP (Radar Reports) and Warning Coordination (RAWARC) System circuits. Other types of observations such as radar or surface can be requested, but these are not sent on all RAWARC circuits unless NSSFC's Severe Local Storm (SELS) Unit deems it appropriate.

1.1.2.b. Public and Aviation Severe Weather Watch Bulletins are issued as required. These Bulletins will be numbered serially in a calendar year, with Aviation Severe Weather Watch Bulletins (WW) and Public severe Weather Watch Bulletins each having a separate numbering system.

1.1.2.c. If it is necessary to cancel a watch, a separate, serially numbered Bulletin which is in consonance with the numbering system of the original watch will be issued. It will be called a "Tornado (Severe Thunderstorm) Watch Cancellation Bulletin" or an "Aviation Severe Weather Watch Cancellation Bulletin," as appropriate. The Bulletin cancelling a public watch will specify the numbered watch and geographical area cancelled. A Bulletin cancelling an aviation watch will usually specify only the number of the watch cancelled. If the original WW contained more than one severe weather watch area, the Cancellation Bulletin will give the area number, if only one area is being cancelled.

1.1.2.d. A brief status report on the development or lack of development of the severe weather forecast in each aviation severe weather watch area will be prepared. These will be prepared at 3-hourly intervals, with the first one being prepared 3 hours after the issuance time of the Watch. The report will be called "Status Report on WW NR _____," and is transmitted as an appropriate separate message on all Service A and RAWARC circuits.

1.1.2.e. The responsibility for the issuance of all-clears for all or any part of the aviation severe weather watch area rests with SELS and should be based on consideration of all available data. All-clears should be issued in a logical sequence at 2 or 3-hourly intervals as the weather situation moves through successive parts of the watch area. If the threat of severe weather is ending rapidly in sections of the watch area, the 2-hour interval is preferable, if not oftener. Such releases will be designated as "All-Clear Information on WW Number _____." When SELS cancels an aviation severe weather watch area by means of a Cancellation Bulletin, it will not be necessary to send a Status Report or All-Clear message. All-Clear information on the same or another WW may be included with a Status Report.

1.1.2.f. The National Hurricane Center (NHC) and the appropriate Hurricane Warning Office are contacted 2 hours before the scheduled time of release of an advisory or bulletin if tropical cyclone-induced tornadoes are expected. The SELS will issue Aviation Severe Weather Watch Bulletins, but not public tornado watches, for tornadoes anticipated in areas where Hurricane Warning Offices are issuing advisories and/or bulletins. Such information will be included in the appropriate advisory or bulletin. An Aviation Severe Weather Watch Bulletin for the area of concern will be prepared, and is usually released, about 1 hour before the valid time of the hurricane or tropical storm advisory. Whenever a critical tornado situation develops between the normal times advisories or bulletins are issued, a special bulletin is issued promptly by the appropriate Hurricane Warning Office. The SELS will promptly issue a corresponding WW.

1.1.2.g. All Public Severe Weather Watch Bulletins are distributed to all WBOs on RAWARC and by means of telephone to those WBOs that do not have RAWARC.

1.1.2.h. All Aviation Severe Weather Watch Bulletins are transmitted on Service A and all RAWARC circuits.

1.1.2.i. The Radar Analysis and Development Unit (RADU) of NSSFC issues hourly radar summaries (SD-1) for Service A teletypewriter transmission. Fourteen radar summary charts are prepared and transmitted daily on the National Facsimile Circuit (NFC).

1.1.2.j. The Communications Unit has the responsibility for relaying severe weather information (reports of severe local storms, warnings, and severe weather statements) received on one RAWARC circuit to any other designated RAWARC circuit. Weather Bureau and Air Force Radar Reports (RAREPS) which are needed on other RAWARC circuits will be routinely relayed to the proper circuit.

1.1.2.k. Followup information, such as all-clear and forecast guidance material, are issued after a watch is distributed to keep all offices fully informed of important changes in trends resulting from special analyses. This will normally be done by means of the Status Reports and All-Clear information issued on WWs.

1.1.2.l. The Severe Weather Outlook Narrative (AC) is prepared for appropriate teletypewriter dissemination. The Severe Weather Outlook Graphic is prepared for facsimile dissemination. These Outlooks describe the most likely areas of thunderstorm and severe thunderstorm development. The AC is prepared twice daily; the Severe Weather Outlook Graphic is prepared daily from February 1 to August 31, and as required the rest of the year.

1.1.2.m. A mean wind vector of the winds between the surface and 200 millibars for all areas covered by aviation and public watches will be prepared. This vector will be transmitted as part of the E section of the pertinent Aviation Severe Weather Watch Bulletin. Format will be "Mean Wind Vector DDDFF," where DDD is the direction to the nearest 5 degrees, and where FF is the wind speed to the nearest 5 knots.

1.1.3. Weather Bureau Offices (WBO).

1.1.3.a. Public Severe Weather Watch Bulletins will be distributed immediately to the public in accordance with each WBO's county responsibility plan whenever a threat to any part of the area of county responsibility is indicated by the Bulletin. To help the public visualize which areas are affected by the watch, the affected areas are restated in terms of counties, geographical areas, or prominent cities. Publications and distribution of various types of material have made the public aware of the Weather Bureau's warning service and its terminology.

1.1.3.b. Warning responsibility for the general public is fundamentally vested in local WBOs. If a severe local storm is in progress or its existence is suspected, the local WBO should issue a warning for the threatened areas in its area of county responsibility and ensure that adjoining WBOs are informed, even if no prior guidance has been received from SELS or from the responsible WBFO with area forecast center responsibilities.

1.1.3.c. Local WBOs are authorized to issue all-clears for all or parts of their areas of county responsibility when the threat of severe weather has ended.

1.1.3.d. Severe weather statements will be issued, as appropriate, to provide information on developing severe weather, lack of such development, or severe weather which has occurred or is in existence.

1.1.3.e. All routine, special surface, and upper air observations which are required to carry out the responsibilities of the WBOs in the severe weather program are taken and transmitted.

1.1.3.f. As appropriate, statements concerning severe local storms which are expected to develop during a period covered by severe weather watches will be included in regularly scheduled local, State, and zone forecasts. Zone forecasts are updated as soon as possible after a tornado watch is issued. Zone forecasts will also be updated when a severe thunderstorm watch is issued and no thunderstorms are in the current forecasts for the valid period of the watch; otherwise, zone forecast revision is at the discretion of the forecaster.

1.1.4. Flight Advisory Weather Service (FAWS) Units at WBFOs.

1.1.4.a. In-Flight Advisories for periods up to 4 hours for aircraft (civil and military) and amendments to appropriate aviation forecasts are prepared whenever severe local storms or storm is expected or is in existence. This can be done even though no prior guidance has been received from SELS, but in such instances, SELS will be notified immediately.

1.1.4.b. The Aviation Severe Weather Watch Bulletins will be reflected as Significant Meteorological Information (SIGMETS) and Airmen's Meteorological Information (AIRMETS) as soon as appropriate after issuance.

1.2. U.S. Air Force.

The U.S. Air Force (USAF) through the Air Force Global Weather Central (AFGWC), Offutt Air Force Base (AFB), Nebr., shall provide:

1.2.1. Weather warning support in the conterminous United States, plus 200 miles offshore to:

1.2.1.a. U.S. Air Force and U.S. Army installations.

1.2.1.b. Air National Guard and Air Force Reserve Units.

1.2.1.c. Plant sites and facilities operated under Department of Defense (DOD) contracts.

1.2.1.d. Airborne military aircraft.

1.2.2. By means of the USAF communications system:

1.2.2.a. Military weather warning advisories for general areas in graphic form, four times daily, at 00Z plus every 6 hours, valid for 12 hours.

1.2.2.b. Point weather warnings in plain language as required when weather is expected to meet warning criteria. These point warnings are issued to approximately 500 military locations in the conterminous States.

1.2.2.c. Severe weather summaries of occurrences of severe convective activity.

1.2.2.d. Further weather outlooks in plain language twice daily for the 6-hour period beyond the 00Z and 12Z advisories.

1.2.2.e. A continuous meteorological watch on the possibilities of severe weather developments and on other weather phenomena for which AFGWC has warning responsibility.

1.3. U.S. Navy.

1.3.1. The U.S. Navy does not operate a centralized local storm warning service. Requirements for early warnings of hazardous flying conditions and local destructive phenomena are met by NSSFC/AFGWC products interpreted locally by Naval Weather Service (NWS) personnel. Full use is made of information displayed on the National Facsimile, military, and civil weather circuits.

1.3.2. The U.S. Navy shall provide one fulltime Synoptic Weather Radar Network station at Naval Air Station (NAS) Pensacola, Fla.

1.4. Federal Aviation Administration (FAA). The FAA shall provide:

1.4.1. Communication services in support of Severe Local Storms Operation Program (Service A, Area B Service, and Service C).

1.4.2. Pilot Reports (PIREPS) for use in the Severe Local Storms Operation Program.

1.4.3. Flight Service Station (FSS) and tower surface observations.

1.4.4. Distribution of AIRMETS and SIGMETS by FSS.

1.5. Exchange of Data Between Agencies. There shall be a mutual exchange of relevant data on the part of all concerned agencies which are outlined in Chapter 1. Since NSSFC and AFGWC are the units responsible for preparing severe weather forecasts, data concerning such forecasts will be exchanged between these units. Direct telephone communications between AFGWC and NSSFC may be made by Automatic Voice Network (AUTOVON) through the Richards-Gebaur AFB, Mo., operators.

1.6. Coordination Channel for Exchange of Data. The coordination channel for exchange of data between NSSFC and AFGWC shall be between the Commander, AFGWC, and the Director, NSSFC. Unresolved differences will be referred to the Emergency Warning Section, Weather Analysis and Prediction (WXAP) Division, Weather Bureau, and Headquarters, Air Weather Service (AWS).

1.7. Joint Technique Development Program. At the present time, only the Weather Bureau and the AWS are actively engaged in developing objective severe weather forecasting techniques. These agencies will engage, whenever possible, in a joint technique development program and exchange any objective techniques developed by either agency.

2.0. DEFINITIONS

2.1. General. One of the aims of this Plan is to list and define those common meteorological terms, subject to multiple interpretations, which are used by the agencies preparing severe local storms forecasts and warnings. This will help users receive maximum benefits through maximum understanding.

2.2. Definitions. For the purposes of this Plan, the following definitions will be used:

2.2.1. All-Clear Bulletins. Releases distributed by all field WBOs, other than SELS, which have made public distribution of a severe thunderstorm or tornado warning to indicate that the warning or watch has ended or is cancelled for the area being cleared or for adjacent areas.

2.2.2. Area of County Responsibility. The area encompassing all the counties assigned to a specified WBO. This Office has responsibility for arranging the distribution of warnings and other types of weather information in these counties.

2.2.3. Aviation Severe Weather Watch Bulletin (WW). The severe local storm bulletins prepared by SELS to assist WBOs and FSSs in providing service to aviation. These Bulletins contain "watches" for tornadoes or severe thunderstorms, including a designation of the areas where their probability is high during a specified time period.

2.2.4. Funnel Cloud. A violent, rotating column of air which does not touch the ground, and is usually pendant from a cumulonimbus cloud.

2.2.5. In-Flight Advisories. These Advisories fundamentally serve aircraft in flight and deal solely with potentially hazardous weather within a period of 2 to 4 hours in advance. The time interval between issuance of an Advisory and its expiration is generally 4 hours. There are two types of Advisories issued: AIRMETS and SIGMETS. These Advisories are distributed on Service A to FAA Air Route Traffic Control Centers (ARTCC) and FSS facilities for servicing aircraft in flight, for preflight briefings, and for use by other WBOs as required.

2.2.6. Instability Line. A line of incipient, active, or dissipating nonfrontal instability conditions. It is transitory in character, usually developing to maximum intensity within a period of 12 hours or less, and then dissipating in about the same length of time.

2.2.7. Severe Local Storms Unit (SELS). Designation for the Unit charged with the responsibility for forecasting severe local storms to the general public and aviation interests, the SELS (generally used title) is a part of the NSSFC, located at Kansas,City, Mo.

2.2.8. Severe Local Storms. Dangerous storms that usually cover relatively small geographical areas and periods of time, and are of sufficient intensity to threaten life or property. Examples are tornadoes or thunderstorms accompanied by frequent lightning, large hail, and/or damaging winds.

2.2.9. Severe Local Storm Observing Network. A reporting system consisting of mobile groups and/or strategically located, nonpaid observers who report promptly the occurrence or sighting of severe local storms. These reports are used as a basis for issuing public warnings.

2.2.10. Severe Thunderstorm. A severe thunderstorm is defined by wind gusts of 50 knots or greater and/or by hail (surface or aloft) of 3/4-inch diameter or larger.

2.2.11. Severe Weather Bulletin. Releases distributed by all field WBOs to indicate that a warning has terminated or is cancelled even though a watch or another warning is still in effect in or adjacent to the area, or to cancel a portion of a watch area. The term "bulletin" is used in the heading to identify high-priority traffic, assuring prompt attention by news media and other users.

2.2.12. Severe Weather Outlook Narrative (AC). Written summaries by SELS containing technical information about the possibility and areas of future severe local storms and other thunderstorm developments up to 24 hours in advance, starting at 1200Z. Routine and amended ACs are prepared and transmitted on Service A and RAWARC. Routine ACs are transmitted daily about 0900Z and 1500Z. The AC transmitted at 1500Z will usually be a revision of the 0900Z AC. Amended ACs are issued, as required, when severe local storms develop more rapidly than expected, or when it becomes obvious that severe local storms will not develop as expected.

2.2.13. Severe Weather Outlook Graphic. A graphic depiction of the AC transmitted from SELS on the NFC network near 1100Z, showing the most likely areas of severe and other thunderstorm activity for the 24-hour period following 1200Z. This depiction is a two-panel package, divided into two 12-hour periods: 1200Z-0000Z and 0000Z-1200Z.

2.2.14. Severe Weather Statements. Public releases issued by all WBOs to provide information on developing severe weather, lack of such developments, or severe weather which had occurred or is in existence. Distances in all public releases are expressed in statute miles.

2.2.15. Squall Line. A line of active thunderstorms or squalls which may extend over several hundred miles. It is the phenomenon of the mature or active stage of "instability-line" development, and may be either a solid or broken line of numerous thunderstorms.

2.2.16. Thunderstorm. A local storm produced by a cumulonimbus cloud, always accompanied by lightning and thunder, and usually found with strong gusts of wind, heavy rain, and sometimes hail. Duration seldom exceeds 2 hours for any one storm.

2.2.17. Time of Releases. Local 12-hour standard time is used in all releases to the public except Aviation Severe Weather Watch Bulletins which are given in Greenwich Mean Time (GMT). Daylight Saving Time is used when it is in effect. All military releases are given in GMT. Date of the day just beginning is used when a release is made at midnight.

2.2.18. Tornado. A violent, rotating column of air forming a pendant, usually from a cumulonimbus cloud, and touching the ground. It nearly always starts as a funnel cloud and is accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena.

2.2.19. Tornado (Severe Thunderstorm) Warning Bulletin. Releases issued by local WBOs to warn the public of the approach of a tornado or a severe thunderstorm already in existence or suspected to be in existence.

2.2.20. Tornado (Severe Thunderstorm) Watch Bulletin. The severe local storm bulletins prepared by SELS for the public. The Bulletins contain "watches" for tornadoes or severe thunderstorms, including a designation of the areas where their probability is high during a specified time period.

2.2.21. Waterspout. When a funnel cloud forms over a body of water--such as a bay, lake, or gulf--and touches the water.

3.0. FORECASTS AND WARNINGS

3.1. General. Although every effort was made to standardize terminology, adopt common definitions, and adjust criteria to a common base, it was recognized that each agency had differing operational warning criteria which had to be met. Therefore, standardization will be used wherever possible in forecasts and warnings, but each agency retains the right to specify the forecast and warning criteria which are needed to carry out the missions of their services. The common criteria and differences will be discussed in the following sections.

3.2. Severe Local Storms. To qualify as a severe local storm, at least one of the following conditions must be present:

3.2.1. Tornado.

3.2.2. Funnel Cloud.

3.2.3. Severe Thunderstorms, with either or both:

3.2.3.a. Surface winds with gusts equal to or greater than 50 knots.

3.2.3.b. Hail of 3/4-inch or greater in diameter, aloft or at the surface.

3.2.4. Waterspouts.

3.3. Other Warning Criteria. All other phenomena described in the various warnings, bulletins, and advisories should be categorized as "other warning criteria," and not called severe weather phenomena. Such other warning criteria will be listed separately in appropriate ESSA/Weather Bureau and USAF/AWS publications.

3.4. Thunderstorm Intensity Categories. Only the following thunderstorm intensity classes will be used in the forecasting and warning functions of the agencies listed in Chapter 1.

3.4.1. Thunderstorm. Wind gusts less than 50 knots and hail, if any, less than 3/4-inch in diameter.

3.4.2. Severe Thunderstorm. Wind gusts of 50 knots or greater and/or hail 3/4-inch or greater in diameter, aloft or at the surface.

3.5. Thunderstorm Density Categories. The following adjectives will be used to describe the expected density of severe thunderstorms along an instability line or in an area.

3.5.1. Isolated--an extremely small number are expected.

3.5.2. Few--up to 15-percent coverage.

3.5.3. Scattered--16- to 45-percent coverage.

3.5.4. Numerous--more than 45-percent coverage.

Adjectives, such as the above, will not be used to indicate the expected density of tornadoes. The Tornado Watch Bulletin will simply state that the threat of tornadoes exists in the designated watch area.

3.6. ESSA Weather Bureau Severe Local Storm Warning Service.

3.6.1. Criteria for Severe Weather Watch Bulletins. This section discusses the criteria which must be equaled or exceeded before Severe Weather Watch Bulletins are issued by SELS. The criteria for Aviation and Public Severe Weather Watch Bulletins are the same. Any or all of the categories listed may be mentioned in the following issuances to indicate more fully the severe weather expected.

3.6.2. Wind and Hail Criteria for Severe Weather Watch Bulletins.

3.6.2.a. Severe Thunderstorm. One or more of the following:

(a) Damaging wind, with sustained or gusty surface winds of 50 knots or greater.

(b) Hail, with surface of 3/4-inch diameter or larger.

3.6.2.b. Tornado.

(a) Severe Weather Watch Bulletins that mention expected tornadoes also imply that thunderstorm activity, usually severe is also expected. Funnel clouds will not be forecast in either Aviation or Public Severe Weather Watch Bulletins.

(b) Distances from reference points in public forecasts will be expressed in statute miles.

(c) Distances from reference points in aviation forecasts will be expressed in nautical miles.

3.6.3. Examples of Public Severe Weather Watch Bulletins.

3.6.3.a. ALSYM A MKCC 022205Z

TORNADO WATCH BULLETIN NUMBER 23
ISSUED 4 PM CST MARCH 2 1967.

THE WEATHER BUREAU HAS ISSUED A TORNADO WATCH FOR...
PORTIONS OF EASTERN LOUISIANA
A PORTION OF WEST CENTRAL ALABAMA AND
MOST OF MISSISSIPPI.

THE THREAT OF TORNADOES WILL EXIST IN THESE AREAS FROM 5 PM UNTIL 11 PM CST THIS THURSDAY EVENING. SCATTERED SEVERE THUNDERSTORMS WITH LARGE HAIL AND LOCALLY DAMAGING WINDS ARE ALSO FORECAST.

THE GREATEST THREAT OF TORNADOES AND SEVERE THUNDERSTORMS IS IN AN AREA ALONG AND 70 MILES EITHER SIDE OF A LINE FROM BATON ROUGE LOUISIANA TO TUPELO MISSISSIPPI.

PERSONS IN OR CLOSE TO THE TORNADO WATCH AREA ARE ADVISED TO BE ON THE WATCH FOR LOCAL WEATHER DEVELOPMENTS AND FOR LATER WEATHER STATEMENTS AND WARNINGS.

3.6.3.b. ALSYM A MKCC 022250Z

SEVERE THUNDERSTORM WATCH BULLETIN NUMBER 24
ISSUED 4:40 PM CST MARCH 2 1967.

THE WEATHER BUREAU HAS ISSUED A SEVERE THUNDER-STORM WATCH FOR...
PORTIONS OF CENTRAL OKLAHOMA AND
A PORTION OF SOUTH CENTRAL KANSAS.

THE THREAT OF ONE OR TWO ISOLATED SEVERE THUNDERSTORMS WITH LARGE HAIL AND DAMAGING WINDS WILL EXIST IN THESE AREAS FROM 6:00 PM UNTIL MIDNIGHT CST THIS THURSDAY EVENING.

THE GREATEST THREAT OF SEVERE THUNDERSTORMS IS IN AN AREA ALONG AND 70 MILES EITHER SIDE OF A LINE FROM 40 MILES EAST OF WICHITA KANSAS TO 20 MILES SOUTH OF ARDMORE OKLAHOMA.

PERSONS IN OR CLOSE TO THE SEVERE THUNDERSTORM WATCH AREA ARE ADVISED TO BE ON THE WATCH FOR LOCAL WEATHER DEVELOPMENTS AND FOR LATER STATEMENTS AND WARNINGS.

3.6.4. Example of Tornado Watch Cancellation Bulletin.

ALSYM A MKCC 102242Z

TORNADO WATCH CANCELLATION BULLETIN NUMBER 100
ISSUED 5:40 PM CDT JUNE 10 1967.

THE WEATHER BUREAU HAS CANCELLED TORNADO WATCH NUMBER 99
ISSUED AT 2:00 PM CDT THIS SATURDAY AFTERNOON FOR...
PORTIONS OF EASTERN LOUISIANA
A PORTION OF WEST CENTRAL ALABAMA AND
MOST OF MISSISSIPPI.

TORNADOES ARE NOT EXPECTED TO DEVELOP AS EXPECTED IN
THESE AREAS AND PERSONS IN OR CLOSE TO THE PREVIOUSLY
DESIGNATED AREAS CAN RESUME THEIR NORMAL ACTIVITIES.

3.6.5. Example of Aviation Severe Weather Watch Bulletin (WW).

ALSYM A MKCC 071803Z

WW MKCC 071803Z

MKC 071800Z

AVIATION SEVERE WEATHER WATCH BULLETIN NUMBER 342.

AREA ONE...TORNADO WATCH VALID 2000Z to 0200Z.

A. ALG AND 60 NM EITHER SIDE OF A LINE FM CHILDRESS TEX TO TULSA OKLA.

B. TORNADOES AND SCTD SVR TSTMS WITH HAIL SFC AND ALF TO 1 IN. EXTRM TURBC AND SFC WND GUSTS TO 65 KTS. NMRS CBS WITH MAX TOPS 450.

C. INSTBY LINE DVLPG 1900Z to 2000Z VCNTY DODGE CITY KAN CHILDRESS TEX 30 MIS E MIDLAND TEX SWWD MOVG EWD 20 TO 25 KTS.

AREA TWO...SVR TSTM WATCH VALID 2100Z to 0300Z.

A. ALG AND 50 NM EITHER SIDE OR A LINE FM 60 NM MIS E MIDLAND TEX TO DALLAS TEX.

B. A FEW SVR TSTMS WITH HAIL 3/4 TO 1 IN DIAM. EXTRM TURBC MAX AND SFC WND GUSTS TO 60 KTS ISOLD 70 KTS. SCTD CBS WITH MAX TOPS TO 400.

C. SAME AS C IN AREA 1 ABV.

AREA THREE..SVR TSTM WATCH VALID 1900Z to 2400Z.

A. ALG AND 50 NM...EITHER SIDE OF A LINE FM COLUMBIA S.C. TO BLACKSTONE VA.

B. ISOLD SVR TSTMS WITH HAIL SFC AND ALF TO 3/4 IN. EXTRM TURBC AND SFC WND GUSTS TO 50 KTS. A FEW CBS WITH MAX TOPS TO 400.

C. TSTMS DVLPG ALG APLCNS ERY AFTN MOVG AWAY FM MTNS AND FRMG SQLN OR SERIES SHORT SQLNS MOVG EWD AND SEWD ABT 30 KTS.

D. OTR TSTMS.

TSTMS WITH INSTBY LINE FM SW KANS WRN OKLA INTO W TEX N OF WARM FRONT PRODUCING 1/4 TO 1/2 IN HAIL AND ISOLD SVR TURBC ACRS EXTRM SRN KANS INTO W CNTRL MO FM 2000Z TIL 0600Z. WIDESPREAD CNVTV TSTM ACTVTY DVLPG ARND 1800Z TO 1900Z FM CNTRL LA ACRS SRN MISS SRN ALA NRN FLA NWD THRU GA CAROLINAS MD AND DEL. THESE TSTMS MORE ACTV AND NMRS FR CNTRL ALA INTO ERN GA.

E. OTR WATCH INFO
CONT WW NR 341 TIL EXPIRATION TIME.

F. MEAN WIND VECTOR 24550.

3.6.6. Example of Aviation Severe Weather Watch Cancellation Bulletin.

ALSYM A MKCC 261730Z

WW MKCC 261730Z

MKC 261725Z

AVIATION SEVERE WEATHER WATCH CANCELLATION
BULLETIN NUMBER 381.

THE WEATHER BUREAU HAS CANCELLED AVIATION SEVERE THUNDERSTORM WATCH NUMBER 380 ISSUED AT 1500Z MAY 26 1967.

3.7. Functions of Radar Analysis and Development Unit (RADU).

An important adjunct of NSSFC is the RADU. The radar facsimile chart and the hourly radar summary (SD-1), transmitted on Service A circuits, are prepared by this Unit.

Every hour, insofar as practicable, RADU utilizes all available radar data. In the event that it is necessary to omit some reports, the areas of minimum significance will be omitted and this fact indicated in the radar facsimile chart and/or SD-1 summary.

Fourteen radar summary charts are transmitted on the NFC. In general, the Western Region radar composite, prepared by the Salt Lake City, Utah, RADU at the FAA's Air Route Traffic Control (ARTC) site, will be used for the western portion of these charts. Data from military and Weather Bureau radars are not superimposed on the detailed ARTC data. In those areas where data from the military radars overlap data from the ARTC radars, data from the ARTC radar will be used. In areas where radar data from an ARTC and Weather Bureau radar overlap, data from the Weather Bureau radar will be used unless the RADU analyst believes the ARTC data are more representative. During those times when data are not available from ARTC sites, RAREPS from military radars will be plotted as received. Data from the WSR-57 at Amarillo, Tex., are used instead of those from the Amarillo ARTC radar. As additional radars are added to the Synoptic Weather Radar Network, data from these radars will be used.

The alphanumeric SD-1 is prepared after the radar summary chart. Echoes are grouped in predetermined geographical areas (fig. 1) and the reference points will be those shown in figure 2. A special effort is made to include echo configurations which are indicative of severe weather, such as lines.

The facsimile (ADUS) chart provides a much more detailed and accurate picture of the radar patterns. Echoes can be traced in detail on the facsimile chart where they must, in the interst of brevity, be grouped together into larger areas for the SD-1. Scale of the radar summary charts is 1:13 M.

3.8. Severe Weather Warnings.

Severe weather warnings will be issued immediately by the appropriate WBO when reports of actual or suspected severe weather in or near a station's area of responsibility indicate an imminent threat. In those cases where a warning is issued without prior guidance from SELS, the WBO will notify SELS immediately of the action taken, using RAWARC where available.

3.8.1. Types of Warnings. Each warning will be identified as a Severe Thunderstorm Warning Bulletin or Tornado Warning Bulletin. It will mention the most severe type of weather expected at the surface, identify the WBO originating the warning, and give the date and time of release.

3.8.2. Time Interval. Time interval for a warning is usually for and seldom exceeds 1 hour. Valid time of the warning is specified in the Warning Bulletin. The warning is updated or an all-clear issued as appropriate at the end of the hour, although the warning may be cancelled sooner if the threat ends.

FIGURE 1.

GEOGRAPHICAL AREAS USED IN SD-1 HOURLY RADAR SUMMARIES

NOTE: Usually, radar echoes located within these areas will be grouped together and listed under the appropriate heading. However, if the echoes are confined to a well-known area such as the Ohio Valley, the well-known heading will be used instead.

FIGURE 2. STANDARD REFERENCE POINTS FOR SD-1 SUMMARIES

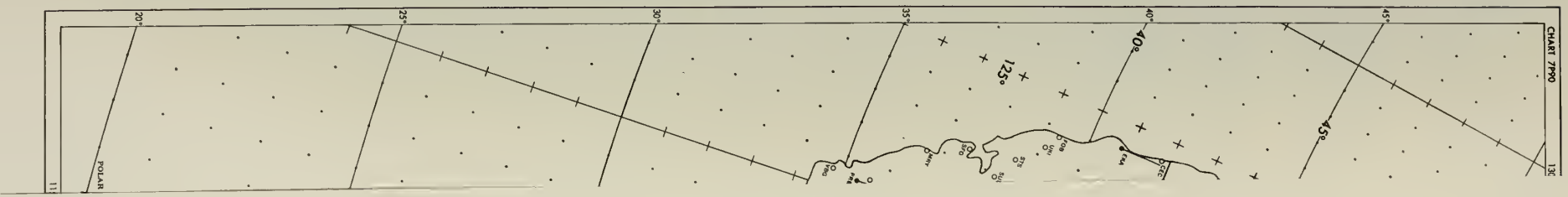
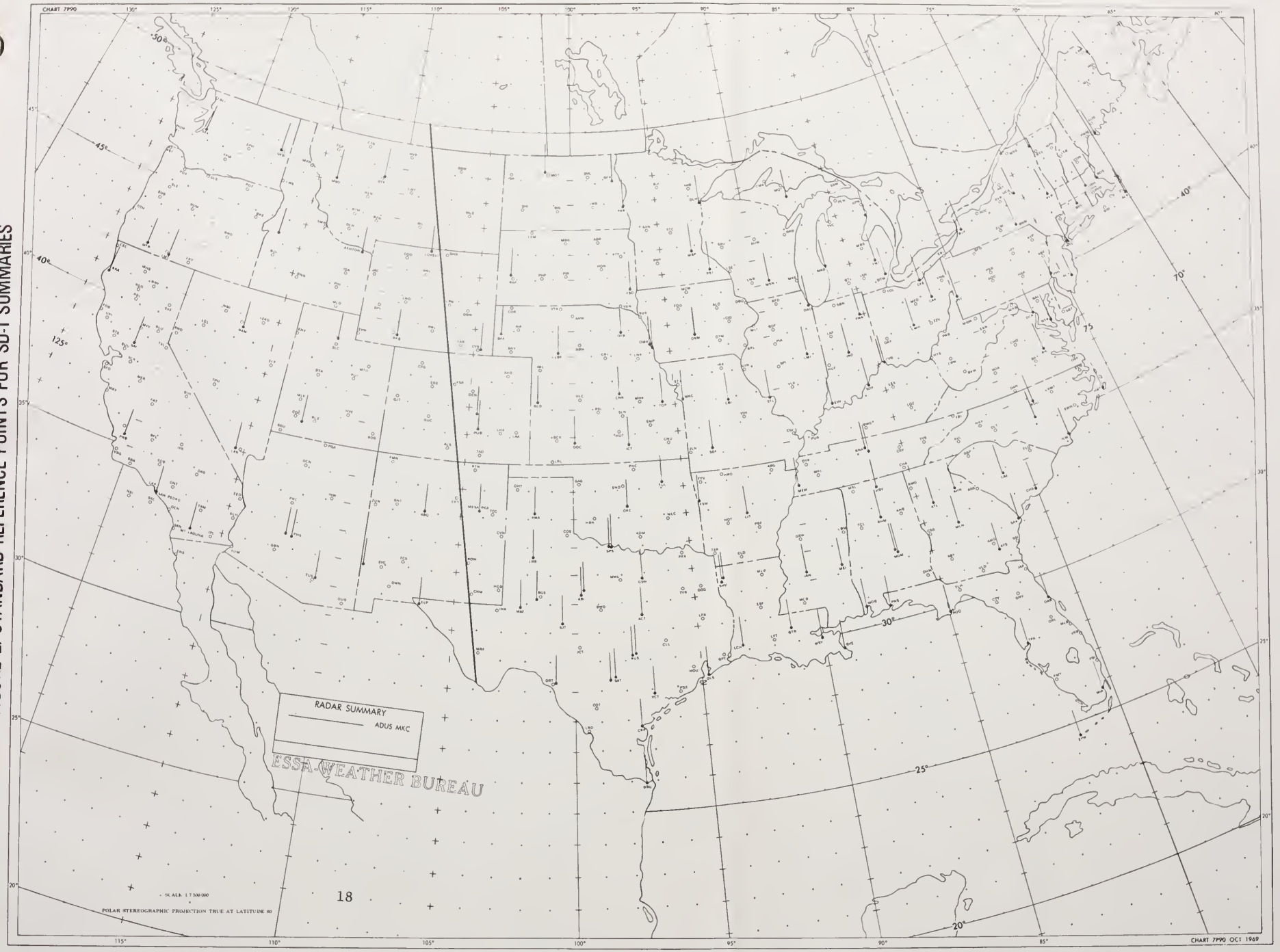


FIGURE 2. STANDARD REFERENCE POINTS FOR SD-1 SUMMARIES



3.8.3. Criteria for Severe Thunderstorm Warning. In general, for warning purposes, a severe thunderstorm is one that is reported to have or suspected of having localized surface wind gusts equal to or greater than 58 miles per hour (50 knots) and/or surface hail 3/4-inch diameter or larger.

3.8.3.a. Information on thunderstorms reported to have or suspected of having winds of less than 58 miles per hour (50 knots), and/or hail less than 3/4-inch diameter are disseminated to the public by means of Severe Weather Statements.

3.8.4. Radar Data as a Basis for Warnings. Full advantage is taken of local radar observations, in addition to those received by teleprinter or by telephone, in issuing Tornado and Severe Thunderstorm Warnings. When radar evidence is sufficient in the judgment of the responsible official to identify a dangerous storm, Warnings based on these data are issued immediately. Ground reports from the threatened area are then secured by telephone calls or through police radio to assist in issuing followup releases.

3.8.5. Examples of Severe Weather Warnings.

3.8.5.a. SEVERE THUNDERSTORM WARNING BULLETIN
EANS REQUESTED
WEATHER BUREAU WICHITA KANSAS
ISSUED 4:40 PM CDT MAY 10 1967.

A SEVERE THUNDERSTORM WARNING IS IN EFFECT UNTIL 5:30 PM FOR PERSONS IN THE KANSAS COUNTIES OF BUTLER COWLEY ELK AND GREENWOOD.

A LINE OF THUNDERSTORMS WAS INDICATED BY RADAR FROM WELLINGTON KANSAS TO AUGUSTA KANSAS AT 4:35 PM CDT. THE LINE OF THUNDERSTORMS IS MOVING TOWARD THE NORTHEAST AT 20 MPH. AT 4:35 PM WELLINGTON REPORTED 70 MPH WINDS AND 1 INCH HAIL.

IF THREATENING CONDITIONS ARE SIGHTED BE PREPARED TO MOVE TO A PLACE OF SAFETY. TO REPORT LARGE HAIL OR DAMAGING WINDS...PLACE AN EMERGENCY COLLECT CALL TO THE WICHITA KANSAS WEATHER BUREAU OR ASK THE NEAREST LAW ENFORCEMENT AGENCY TO RELAY YOUR REPORT TO THE WEATHER BUREAU.

3.8.5.b. TORNADO WARNING BULLETIN
EANS REQUESTED
WEATHER BUREAU OKLAHOMA CITY OKLAHOMA
ISSUED 4:00 PM CDT APRIL 30 1967.

A TORNADO WARNING IS IN EFFECT UNTIL 5:00 PM FOR PERSONS IN THE OKLAHOMA COUNTIES OF COTTON AND COMANCHE.

A TORNADO WAS REPORTED BY THE PUBLIC 7 MILES EAST OF GRANDFIELD OKLAHOMA AT 3:55 PM CDT. THIS TORNADO IS MOVING TOWARD THE NORTHEAST AT 30 MPH.

IF THREATENING CONDITIONS ARE SIGHTED...BE PREPARED TO MOVE TO A PLACE OF SAFETY. TO REPORT A TORNADO OR OTHER SEVERE WEATHER... PLACE AN EMERGENCY COLLECT CALL TO THE OKLAHOMA CITY OKLAHOMA WEATHER BUREAU OR ASK THE NEAREST LAW ENFORCEMENT AGENCY TO RELAY YOUR REPORT TO THE WEATHER BUREAU.

3.9. FAWS Units's Responsibilities.

3.9.1. Issue In-Flight Advisories.

3.9.1.a. Criteria for issuance of AIRMETS:

(a) Moderate icing.

(b) Moderate turbulence over an extensive area.

(c) Extensive areas of visibilities less than 2 miles and/or ceilings less than 1,000 feet, including mountain ridges and passes; and

(d) Winds of 40 knots or more within 2,000 feet of the surface.

3.9.1.b. Criteria for issuance of SIGMETS:

(a) Tornadoes.

(b) Lines of thunderstorms (squall lines).

(c) Embedded thunderstorms.

(d) Hail of 3/4-inch diameter or more, surface or aloft.

(e) Severe and extreme turbulence.

(f) Heavy icing.

(g) Widespread duststorms or sandstorms lowering visibilities to less than 2 miles.

3.9.2. Advise ARTCCs of any SIGMETS that they issue which affect their respective ARTCC areas.

3.9.3. Include appropriate reference to expected severe weather in In-Flight Advisories, scheduled and amended aviation forecasts, Pilots Automatic Telephone Weather Answering Service (PATWAS), and Transcribed Weather Broadcast (TWEB) scripts.

3.10. USAF Warning Procedures.

3.10.1. General. The AFGWC provides, by means of the USAF communications system, warnings for:

3.10.1.a. Tornadoes.

3.10.1.b. Thunderstorms.

3.10.1.c. Strong surface winds.

3.10.1.d. Heavy rain or snow.

3.10.1.e. Freezing precipitation.

3.10.1.f. Severe blowing dust, sand, or snow.

3.10.1.g. Funnel clouds.

3.10.1.h. Waterspouts.

3.10.2. Military Weather Warning Advisories. The AFGWC issues Graphic Military Weather Warning Advisories (fig. 3 and 4) four times daily at 0000Z plus every 6 hours. Each Advisory gives the areas where any of the weather elements listed above are expected to exist in the following 12-hour period. An Advisory is an estimate of the weather-producing potential of the existing synoptic pattern and airmasses, based on the assumption that subsequent changes in these features occur as forecast.

3.10.2.a. Purpose and Use. The Graphic Warning Advisories are designed to provide basic guidance to both the field forecaster and to the point warning forecasters at the AFGWC. They are issued at fixed times; preparation time is limited by data availability and presentation format. Advisories may contain fairly large areas as in the case of thunderstorms, snow, and strong gradient winds, but the areas of more severe weather such as tornadoes and severe thunderstorms are usually more limited in time and space. Field forecasters should use the Graphic Advisories:

(a) To alert themselves and users to potential areas of significant weather.

(b) To use as ready-made briefing aids.

(c) To indicate the probability of their stations being directly affected during the advisory period.

3.10.2.b. Amendment. Advisories are amended when elements described change, or are expected to change, one category or more (for example, nonsevere thunderstorm expected to become severe thunderstorm), and when area boundaries change, or are expected to change, by 60 miles or more.

3.10.2.c. Geographical Interpretation. A clear plastic over-lay, containing a scaled outline of the conterminous States, placed on the teletypewriter message containing the Graphic Advisory, will provide geographical orientation.

3.10.3. Point Weather Warnings. Point Weather Warnings are issued in plain language (see fig. 5) for the same phenomena as Advisories. While Advisories provide general guidance to all military forecasters in terms of large- and intermediate-scale synoptic developments, Point Warnings are issued for and to specific locations in the smallest scale of space and time consistent with the availability of data and the state of the art. The locations for which AFGWC has warning responsibility are listed in Attachment 1, Volume II, Air Weather Service Manual 55-8. Some of these locations include two, three, or four installations in one locality; the total number of installations is well over 500. Approximately 50 percent of these are Air Force, 45 percent are Army, and 5 percent are Navy. In addition to active military installations, Point Warnings are issued for National Guard units, arsenals, ammunition plants, and other civilian activities under contract to the DOD.

FIGURE 3. EXAMPLE OF DESCRIPTIVE PORTION OF A MILITARY WEATHER WARNING ADVISORY

KGWC
WWXX WWXX WWXX KGWC 061200Z
MILITARY WEATHER WARNING ADVISORY NR 23 VALID 061800Z to 070600Z

GRAPHIC BULLETIN

X...RED AND BLACK...TORNADOES AND/OR DAMAGING WINDSTORM-ISOLATED...THUNDERSTORMS SCATTERED-FEW SEVERE WITH 1 1/2 INCH HAIL AND WSW TO NW GUSTS TO 65 KNOTS...MAX THUNDERSTORMS TOPS 500...LOCALLY HEAVY RAIN SHOWERS... 2000Z-0400Z...SURFACE WINDS SSE TO SSW 20 KNOTS GUSTS TO 40 KNOTS...1800Z TO 0000Z...CURRENT ACTIVITY EXTENDING FROM SW OK INTO CENTRAL NB CONTINUING ENE MOVEMENT. SQUALL LINE EXPECTED TO REFORM AFTERNOON FROM SW NB THROUGH WRN KS INTO SW TX MOVING ENE AT 25 TO 30 KNOTS.

O...RED AND BLACK...TORNADOES AND/OR DAMAGING WINDSTORMS-ISOLATED...THUNDERSTORMS SCATTERED-FEW SEVERE WITH 2 INCH HAIL AND WSW GUSTS TO 65 KNOTS... MAX THUNDERSTORMS TOP 520...LOCALLY HEAVY RAIN SHOWERS...1900Z TO 0200Z... SURFACE WINDS SSE TO SSW 20 KNOTS GUSTS TO 35 KNOTS...1800Z TO 0000Z... SEE REMARKS ON PARA X ABOVE.

Z...BLUE AND BLACK...DAMAGING WINDSTORMS-ISOLATED...THUNDERSTORMS SCATTERED-FEW SEVERE WITH 1 TO 1 1/2 INCH HAIL AND WSW TO NW GUSTS TO 65 KNOTS... MAX THUNDERSTORMS TOPS 500...LOCALLY HEAVY RAIN SHOWERS...1900Z TO 0300Z... SURFACE WINDS SSE TO SSW 20 KNOTS GUSTS TO 35 KNOTS 1800Z TO 0000Z.

A...BLACK...SURFACE WINDS WSW TO NW 20 KNOTS FEW GUSTS TO 35 KNOTS...2000Z TO 0200Z.

S...BLACK...SURFACE WINDS SW TO W 20 KNOTS GUSTS TO 35 KNOTS...1900Z TO 0200Z.

T...ORANGE AND BLACK...THUNDERSTORMS FEW-WITH ISOLATED 1/4 INCH HAIL...MAX THUNDERSTORMS TOPS 300...1800Z TO 0300Z...SURFACE WINDS NW 20 KNOTS FEW GUSTS TO 35 KNOTS...1800Z TO 2300Z.

B...ORANGE AND BLACK...THUNDERSTORMS FEW-WITH ISOLATED 1/4 INCH HAIL...MAX THUNDERSTORMS TOPS 350...1800Z TO 0400Z...SURFACE WINDS SSE TO SSW 20 KNOTS GUSTS TO 40 KNOTS...1800Z TO 0100Z.

G...ORANGE...THUNDERSTORMS ISOLATED...MAX THUNDERSTORMS TOPS 300...2000Z TO 0200Z.

M...ORANGE...THUNDERSTORMS FEW-WITH ISOLATED 1/4 INCH HAIL AND SW GUSTS TO LESS THAN 35 KNOTS...MAX THUNDERSTORMS TOPS 320...1900Z TO 0300Z.

FIGURE 4. EXAMPLE OF GRAPHIC PORTION OF A MILITARY WEATHER WARNING ADVISORY

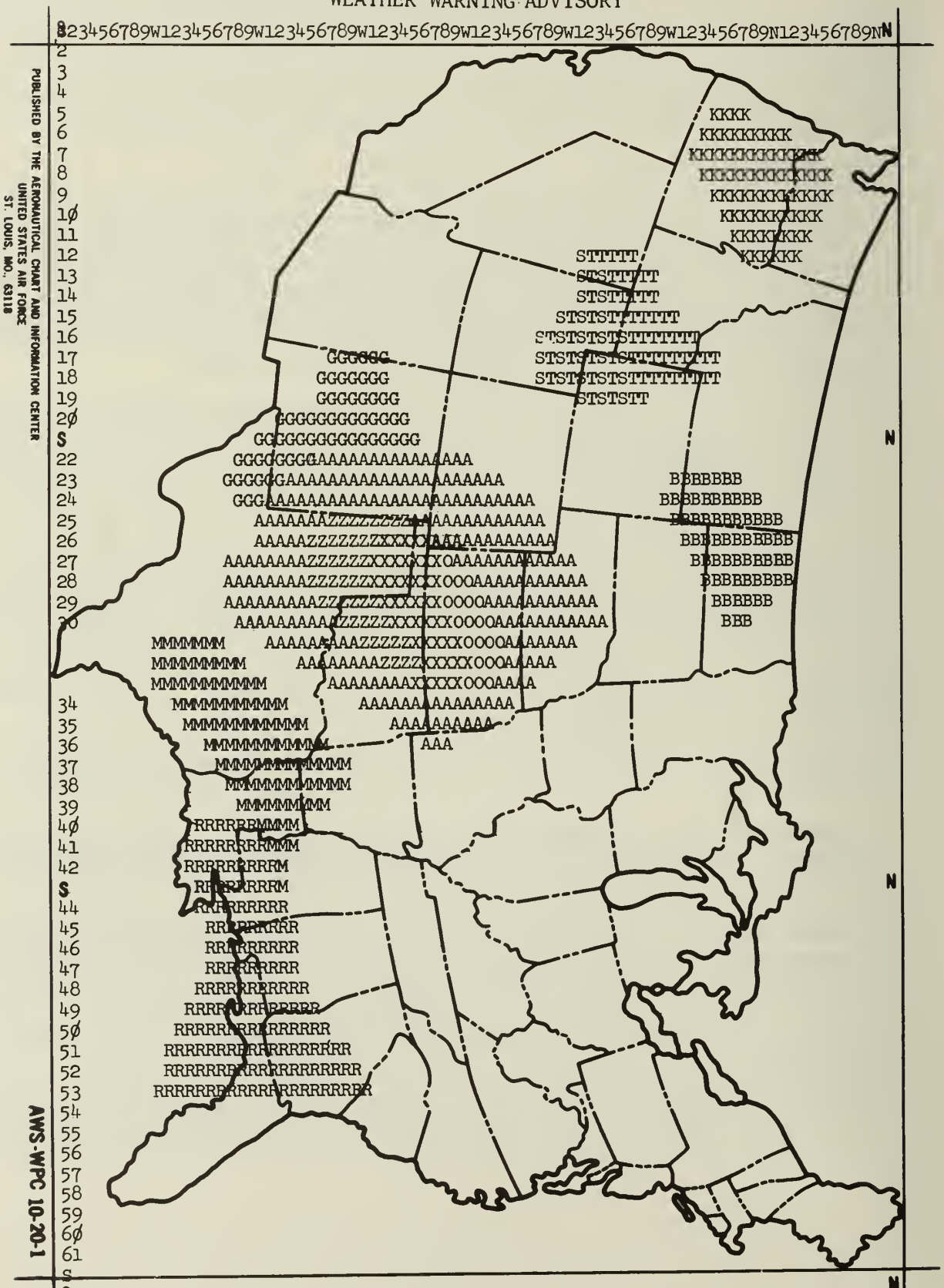


FIGURE 5. EXAMPLE OF MILITARY POINT WARNING

0 032010Z
WWXX WWXX WWXX 3 KGWC 032010Z
TX 18-19

SEVERE THUNDERSTORMS WITH 1/4 INCH HAIL AND SW GUSTS
TO 65 KNOTS VALID 032200Z TO 040200Z TORNADO VICINITY
032200Z TO 040100Z.

OK 7-8

FEW THUNDERSTORMS WITH NO HAIL AND SW GUSTS TO LESS
THAN 35 KNOTS EXPECTED IN YOUR GENERAL AREA BETWEEN
031900Z AND 040300Z.

3.10.3.a. Purpose and Use. Point Warnings are issued for specific locations as the situation warrants in contrast to Advisories which are issued at scheduled intervals for fixed valid periods. Point Warnings are amended, extended, or cancelled as necessary. For the sake of accuracy, the optimum lead time is that just long enough to permit necessary protective action. Point Weather Warnings:

(a) Provide specific warning to an installation where a forecast unit is not assigned.

(b) Alert a responsible individual at locations with limited forecast service.

(c) Alert and guide the field forecaster who has final responsibility for warning the agency he supports.

3.10.3.b. Interpretation.

Area Extent. Point Warnings are issued when specific phenomena are expected to occur within a 10-mile radius of a specific installation, with the following exceptions:

(a) A Point Warning for a tornado is issued for a 25-mile radius of the installation. The term "vicinity" is used to identify this increased area.

(b) A Point Warning for severe thunderstorms is issued for a 25-mile radius of the installation. The term "vicinity" is used to identify this area.

(c) A Point Warning for thunderstorms other than severe is issued for a 50-mile radius of the installation. The term "general area" is used to identify this area.

4.0. COMMUNICATIONS

4.1. ESSA Weather Bureau. Collection and distribution of severe local storms information.

4.1.1. Systems Used.

4.1.1.a. RAWARC. The Weather Bureau's internal RAREP (Radar Report) and Warning Coordination teletypewriter system (see fig. 6 and annex 1).

4.1.1.b. EWWS (ESSA Weather Wire Service). The teletypewriter system, operated by the Weather Bureau, which makes around-the-clock weather service available to all mass dissemination media and to other selected users (see fig. 7 and annex 2).

4.1.1.c. NAWAS (National Warning System). A Civil Defense-operated telephone hot-line which connects Civil Defense Warning Points within each warning area. Usually, one or more WBOs within each State has a drop on this system.

4.1.1.d. EANS (Emergency Action Notification Signal). When there is an urgent need to inform all concerned of existing dangerous weather conditions, radio and television stations covering a threatened area are requested to use the EANS. Use of EANS attracts radio and television listeners' attention to a warning and also makes it possible for anyone with a special receiver, or a special attachment to a conventional radio receiver, to receive the information. The use of EANS for this purpose is at the discretion of the individual radio and television stations.

4.1.2. Distribution of Severe Weather Watch and Warning Bulletins.

4.1.2.a. Public Severe Weather Watch and Warning Bulletins (fig. 8).

4.1.2.b. Aviation Severe Weather Watch Bulletins and In-Flight Advisories (fig. 9).

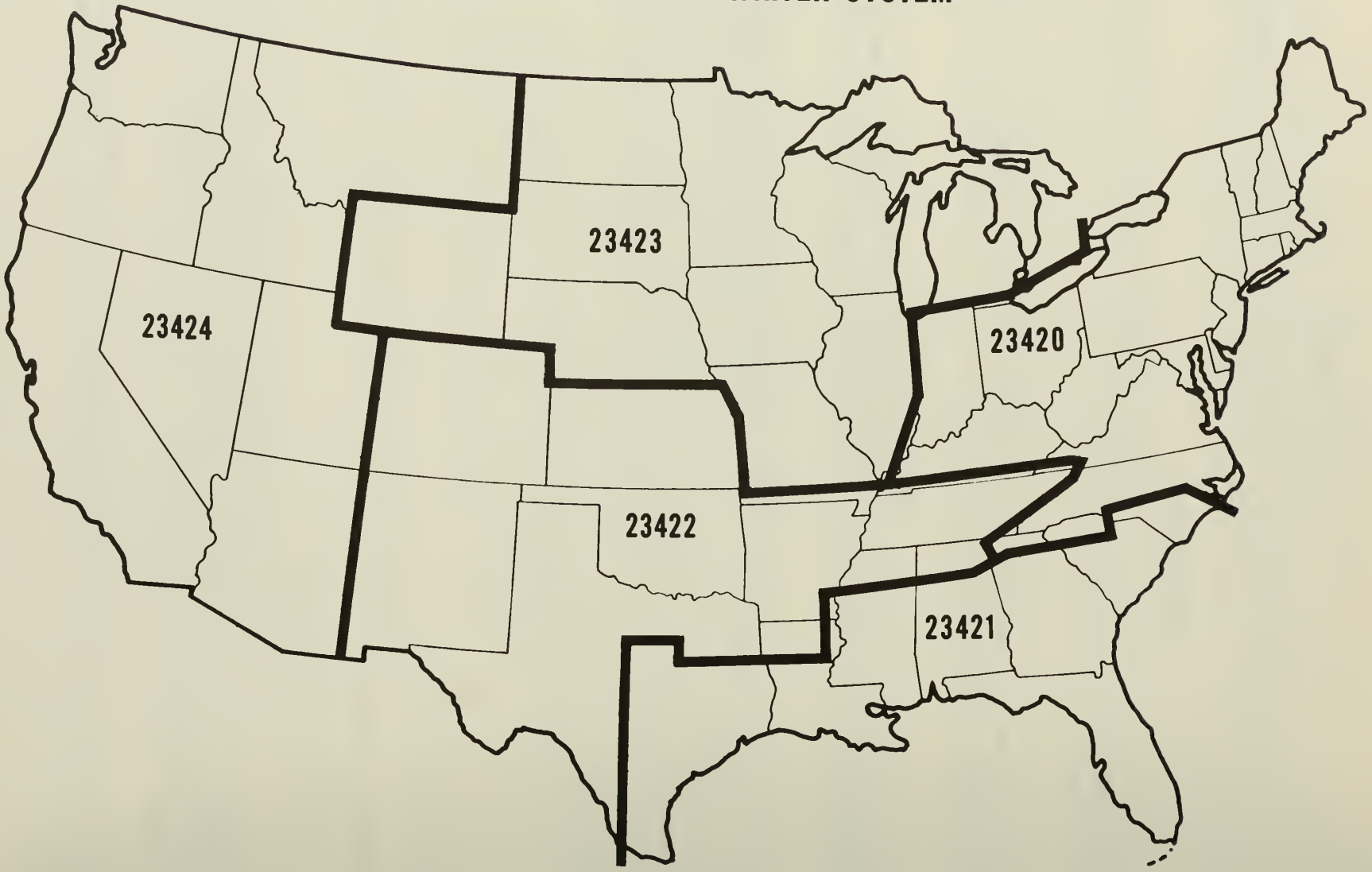
4.2. U.S. Air Force.

4.2.1. Within the conterminous United States, USAF weather radar reports are collected by means of the COMET IIA system and disseminated by the COMET IIB system. Reports collected by means of COMET IIA are transmitted from the Carswell Automated Digital Weather Switch (CADWS) to AFGWC through a computer-to-computer link.

4.2.1.a. The COMET II system is divided into eight geographic areas, with a collecting and disseminating circuit covering each area (fig. 10).

FIGURE 6.

RAWARC TELETYPEWRITER SYSTEM



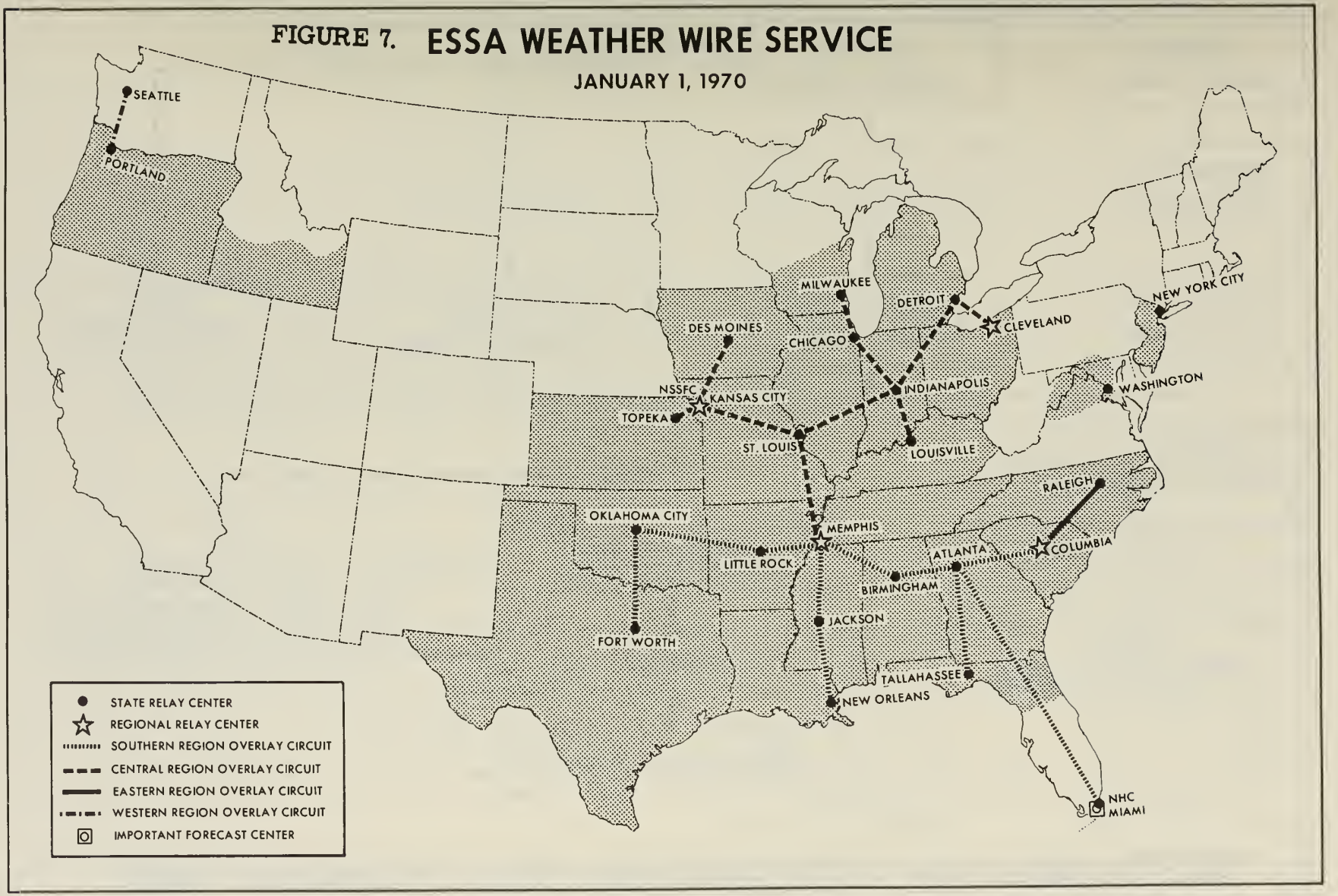


FIGURE 7. ESSA WEATHER WIRE SERVICE
JANUARY 1, 1970
SEATTLE
PORTLAND
MILWAUKEE
DETROIT
NEW YORK CITY
DES MOINES
CHICAGO
CLEVELAND
NSSFC
KANSAS CITY
INDIANAPOLIS
WASHINGTON
TOPEKA
ST. LOUIS
LOUISVILLE
RALEIGH
OKLAHOMA CITY
MEMPHIS
COLUMBIA
LITTLE ROCK
ATLANTA
BIRMINGHAM
JACKSON
FORT WORTH
TALLAHASSEE
NEW ORLEANS
NHC
MIAMI
STATE RELAY CENTER
REGIONAL RELAY CENTER
SOUTHERN REGION OVERLAY CIRCUIT
CENTRAL REGION OVERLAY CIRCUIT
EASTERN REGION OVERLAY CIRCUIT
WESTERN REGION OVERLAY CIRCUIT
IMPORTANT FORECAST CENTER

FIGURE 8. DISTRIBUTION OF PUBLIC SEVERE WEATHER WATCH AND WARNING BULLETINS

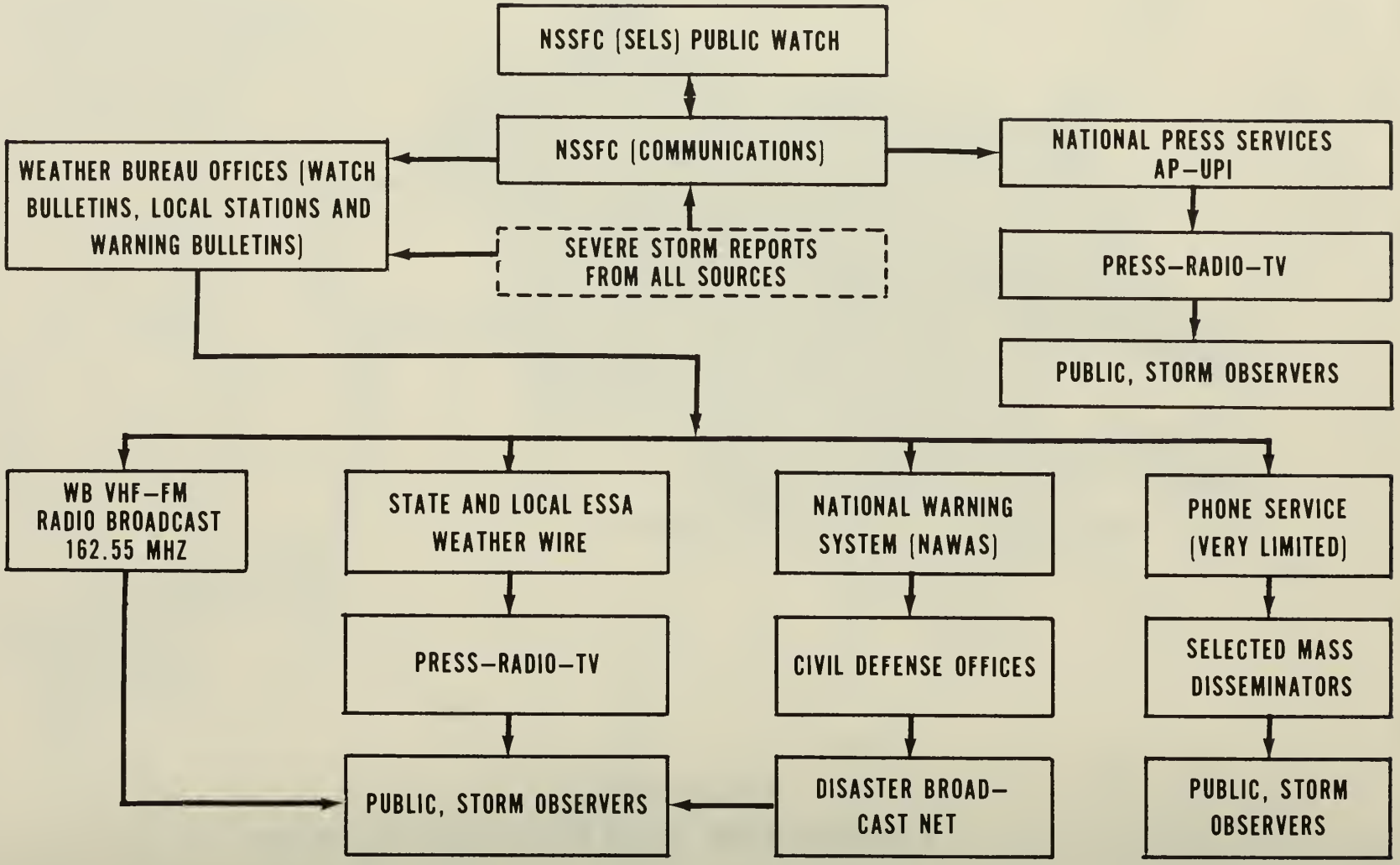


FIGURE 9. DISTRIBUTION OF AVIATION SEVERE WEATHER WATCH BULLETINS-AIRMET AND SIGMET

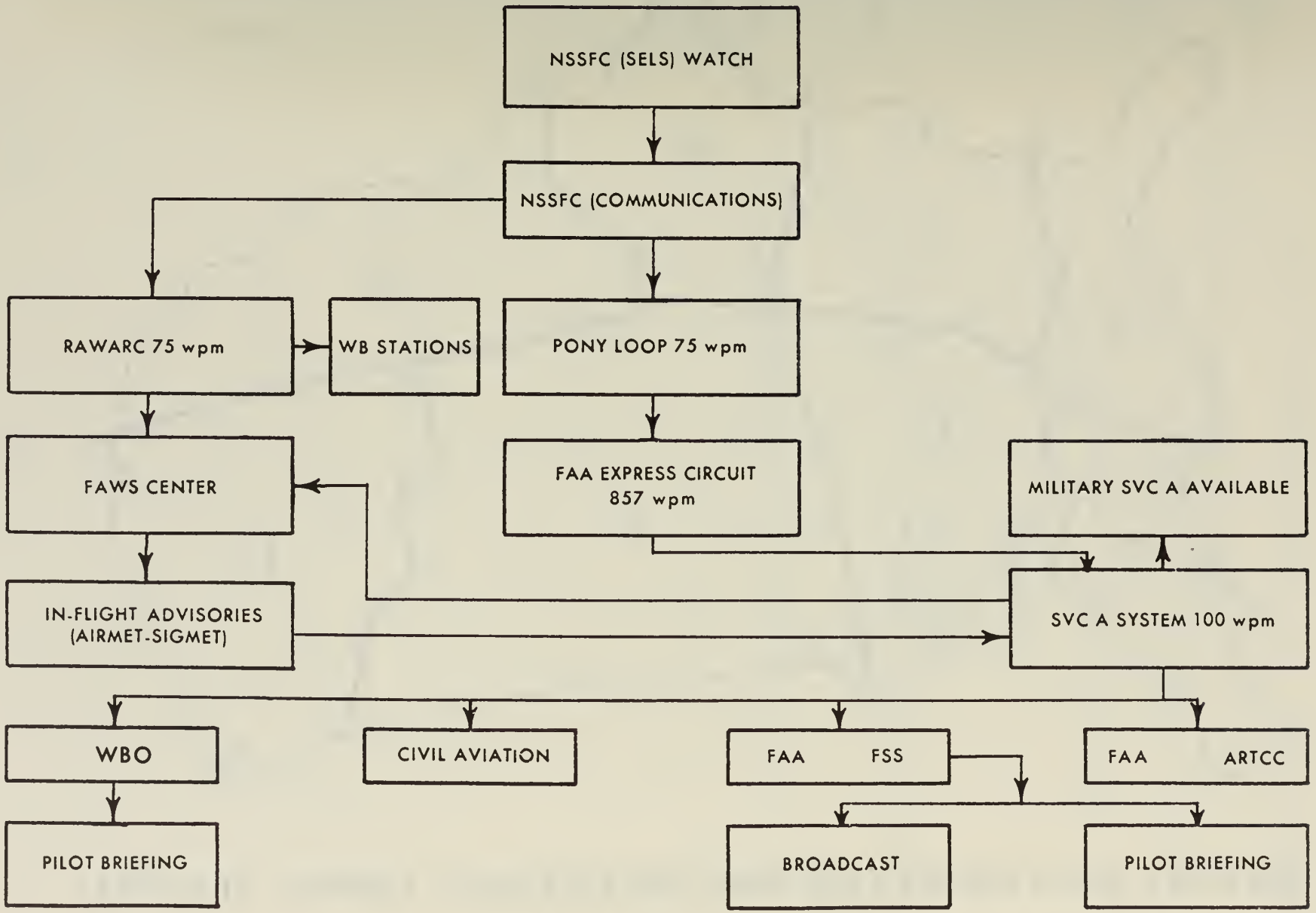


Figure 10. COMET COLLECTING AND DISSEMINATING SYSTEM

4.2.1.b. The COMET II system is used to collect and disseminate radar reports.

4.3. Federal Aviation Administration (FAA).

4.3.1. Service A (see fig. 11) will be used for the collection and distribution of severe local storms information as follows:

4.3.1.a. Hourly and Special Airway Observations.

4.3.1.b. Radar Reports.

4.3.1.c. AIRMETS and SIGMETS.

4.3.1.d. Hourly Radar Summary SD-1.

4.3.2. Area B Service will be used for distribution of PIREPS from FSS to FAWS Offices (see fig. 12).

4.4. U.S. Navy.

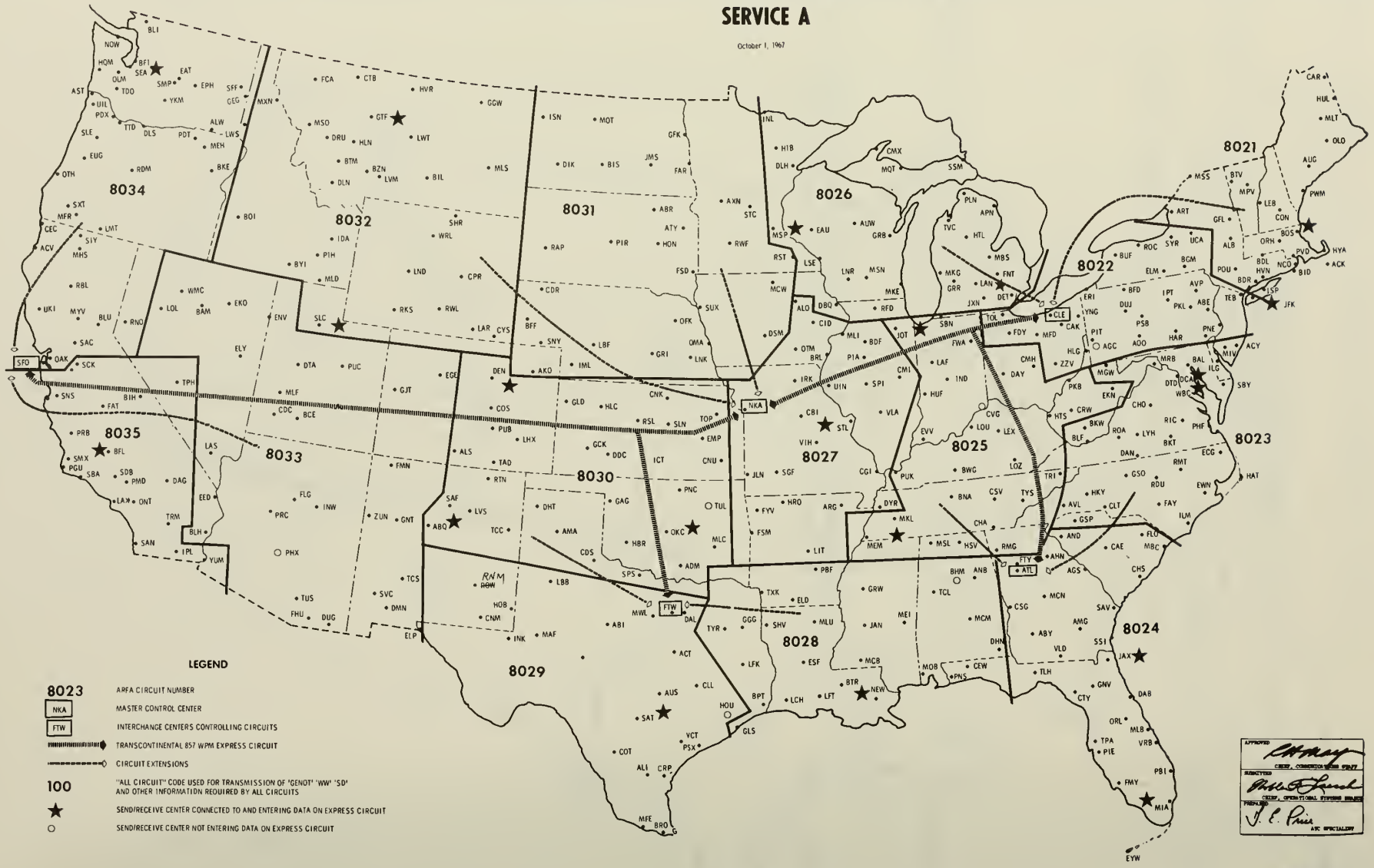
4.4.1. U.S. Navy weather reports are collected by means of the USAF's COMET IIA system and disseminated by the COMET IIB system.

FIGURE 11.

FEDERAL AVIATION ADMINISTRATION

SERVICE A

October 1, 1967



M-14

FIGURE 12.

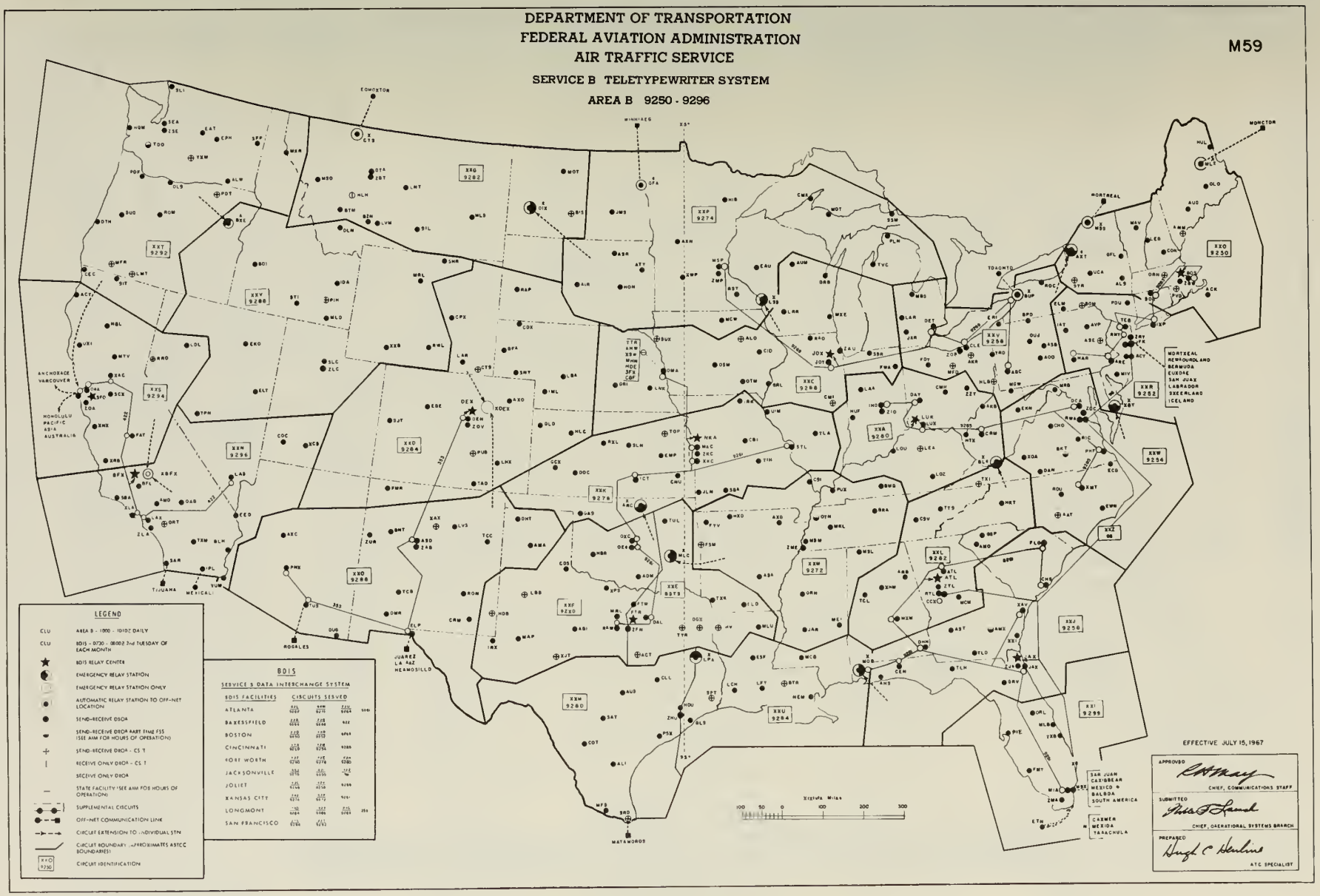
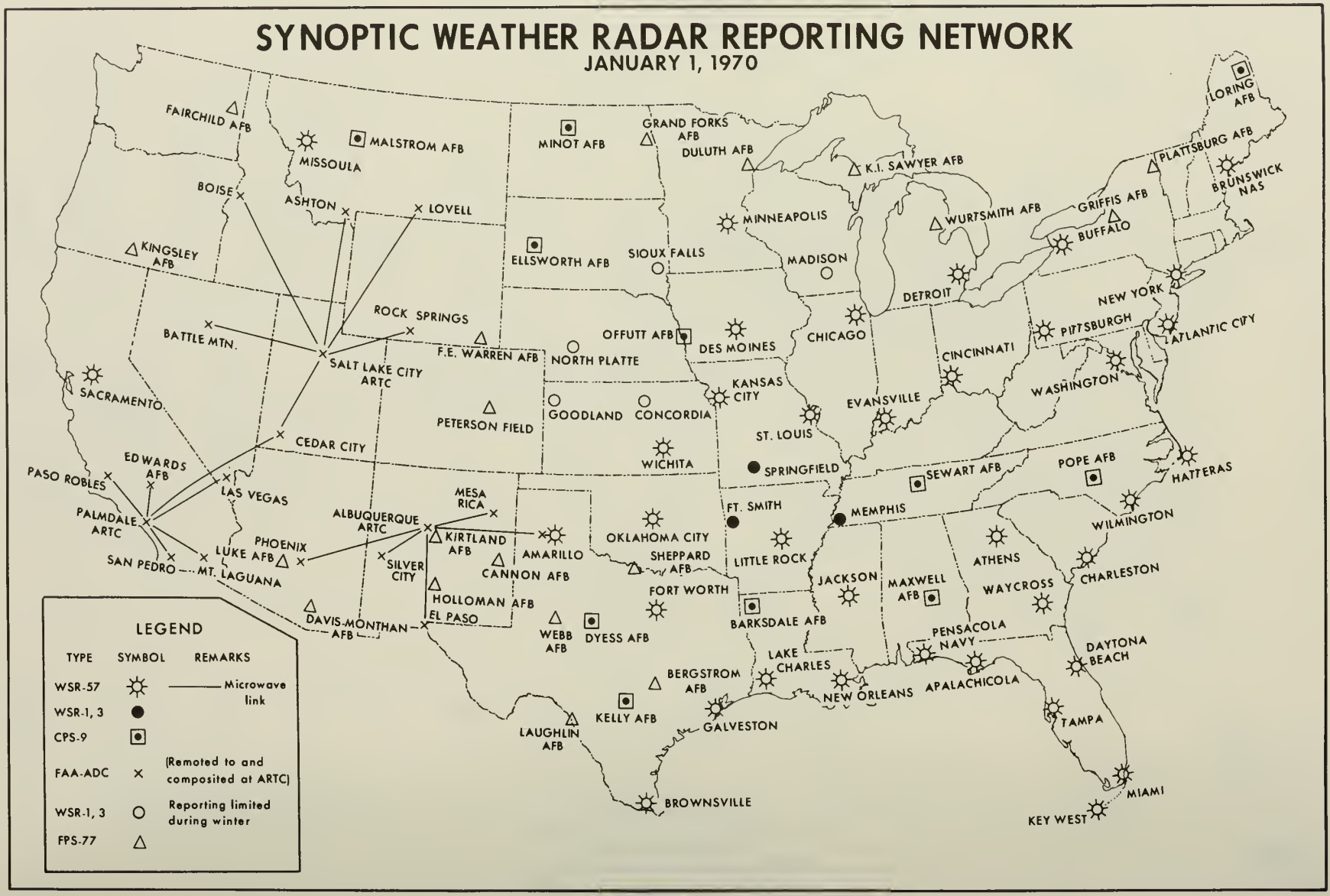

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRAFFIC SERVICE
SERVICE B TELETYPEWRITER SYSTEM
AREA B 9250 - 9296
M59
LEGEND
BDIS
BDIS FACILITIES
CIRCUITS SERVED
EFFECTIVE JULY 15, 1967
APPROVED
CHIEF, COMMUNICATIONS STAFF
SUBMITTED
CHIEF, OPERATIONAL SYSTEMS BRANCH
PREPARED
ATC SPECIALIST

FIGURE 13.


SYNOPTIC WEATHER RADAR REPORTING NETWORK
JANUARY 1, 1970
FAIRCHILD AFB
MALSTROM AFB
MISSOULA
BOISE
ASHTON
LOVELL
KINGSLEY AFB
BATTLE MTN.
ROCK SPRINGS
SALT LAKE CITY ARTC
SACRAMENTO
EDWARDS AFB
PASO ROBLES
PALMDALE ARTC
LAS VEGAS
CEDAR CITY
PHOENIX
LUKE AFB
SAN PEDRO
MT. LAGUANA
ALBUQUERQUE ARTC
MESA RICA
KIRTLAND AFB
SILVER CITY
HOLLOMAN AFB
DAVIS-MONTHAN AFB
EL PASO
MINOT AFB
GRAND FORKS AFB
DULUTH AFB
ELLSWORTH AFB
SIOUX FALLS
PETERSON FIELD
F.E. WARREN AFB
NORTH PLATTE
GOODLAND
CONCORDIA
WICHITA
OFFUTT AFB
AMARILLO
CANNON AFB
OKLAHOMA CITY
SHEPPARD AFB
FORT WORTH
WEBB AFB
DYESS AFB
BERGSTROM AFB
KELLY AFB
LAUGHLIN AFB
BROWNSVILLE
GALVESTON
LAKE CHARLES
NEW ORLEANS
BARKSDALE AFB
MINNEAPOLIS
K.I. SAWYER AFB
WURTSMITH AFB
MADISON
DES MOINES
CHICAGO
KANSAS CITY
ST. LOUIS
SPRINGFIELD
FT. SMITH
LITTLE ROCK
JACKSON
MEMPHIS
EVANSVILLE
DETROIT
CINCINNATI
SEWART AFB
MAXWELL AFB
PENSACOLA NAVY
APALACHICOLA
TAMPA
MIAMI
KEY WEST
LORING AFB
PLATTSBURG AFB
BRUNSWICK NAS
GRIFFIS AFB
BUFFALO
NEW YORK
PITTSBURGH
ATLANTIC CITY
WASHINGTON
POPE AFB
HATTERAS
WILMINGTON
CHARLESTON
ATHENS
WAYCROSS
DAYTONA BEACH
LEGEND
TYPE
SYMBOL
REMARKS
WSR-57
Microwave link
WSR-1, 3
CPS-9
FAA-ADC
(Remoted to and composited at ARTC)
WSR-1, 3
Reporting limited during winter
FPS-77

5.0. OBSERVATIONS

5.1. Radar Observing and Reporting Plans.

5.1.1. General. Radar data which are routinely used in the preparation of NSSFC and AFGWC products are available from radars of the Synoptic Weather Radar Network (fig. 13). This Network is composed mainly of Weather Bureau WSR-57 radars supplemented by Navy and Air Force weather radars. Selection of radars for the Network was made on the basis of attaining the maximum required data with a minimum number of radars. In the western intermountain region, air traffic control radars remoted into the Salt Lake City, Palmdale, Calif., and Albuquerque, N. Mex., ARTCCs are used as substitutes for weather-dedicated radars.

Weather Bureau personnel at Palmdale and Albuquerque composite the radar data from the radars remoted into these sites and transmit them on an interagency facsimile circuit to the Salt Lake City ARTCC's RADU. These data are then composited with the Salt Lake City radar data, and by means of a phone data link, the final composite is sent to the RADU at Kansas City for use in the radar summary chart.

5.1.1.a. Weather Bureau radar observations, other than from these ARTCCs, are transmitted hourly on RAWARC at H+45 in the Weather Bureau-Air Force-Navy (WBAN) RAREP code. More frequent observations are taken in severe weather situations. Data from the ARTCCs are available on the interagency facsimile circuit. Observations are taken at hourly intervals at Salt Lake City, and for 16 consecutive hours at Palmdale between 1245Z and 0445Z. At Albuquerque, hourly observations are taken between 1545Z and 2245Z. When the temperature is below freezing, reporting is limited during the winter at a number of WSR-3 stations assigned to the Network because these radars seldom detect snow.

5.1.1.b. At approximately the same time (H+45), radar reports in the WBAN code from the AWS and Navy radar stations assigned to the Synoptic Weather Radar Network are forwarded to AFGWC from the CADWS by means of the data link. The NSSFC receives these reports by means of a COMET II drop.

5.1.1.c. The Weather Bureau, Navy, and Air Force have other radars which are not a part of the national network. These radars are mainly used for local warning purposes, but on occasion they do enter reports on communications circuits.

5.1.2. Air Defense Command (ADC) Radar Sites. There are a number of ADC radar sites capable of detecting and interpreting weather echoes. Annex 3 lists all such sites, together with their associated AWS Air Division (AD) weather stations. Operational commitments permitting, these sites will gladly provide supplementary reports upon request. However, the number of different agencies trying to contact a particular site must be held to a minimum. In general, either AFGWC or the supervising forecaster of SELS or RADU should attempt to contact a particular site through its associated AD weather station.

5.1.3. Weather Bureau-Military Radar Reporting Agreement. When radar data from the military stations of the Synoptic Weather Radar Network are missing or appear to be in error, the military agencies have authorized the following:

5.1.3.a. The RADU shall call the duty forecaster at the station for the missing data or clarification.

5.1.3.b. The Air Force and Navy shall provide NSSFC with telephone numbers of stations in the National Weather Radar Reporting Network. Telephone numbers of local use radar stations will also be provided for use in emergency situations.

5.1.3.c. If Federal Telecommunications System (FTS) or DOD telephone lines are not available, commercial telephone shall be used.

5.1.4. Local Arrangements for Military Radar Data. If a WBO needs radar data from a nearby military radar (Network, ADC, or local use), such can be obtained by local arrangements between the Weather Bureau Meteorologist-in-Charge and the Weather Detachment Commander or the Commanding Officer of the radar facility. Authorizations for such arrangements have been completed between the Weather Bureau and the military agencies in prior agreements.

5.2. Radiosonde or Rawinsonde Observing Stations.

5.2.1. Network Stations. Radiosonde observations are scheduled twice daily, 0000Z and 1200Z, at the 70 stations in the domestic Radiosonde Network (fig. 14). These stations also take special observations when required and requested by the agency concerned. During the severe local storm season, the Weather Bureau has a mobile upper air station which operates at one of two locations. From February 1 to May 31, it is located at Abilene, Tex. Between June 1 and September 30, it is stationed at Huron, S. Dak.

Transponder capability is available at 33 stations to permit more accurate measurement of upper winds under strong wind conditions. Evaluated data from the routine soundings are transmitted over the Service C and COMET II teletypewriter systems in the regulation radiosonde code. Data from special soundings requested for potential or existing severe weather situations are transmitted by means of RAWARC and other appropriate communications circuits to NSSFC and AFGWC.

FIGURE 14. WEATHER BUREAU AND MILITARY UPPER AIR NETWORK

NETWORK OF WEATHER BUREAU AND MILITARY RADIOSONDE STATIONS IN THE UNITED STATES.

FIGURE 15. URBAN UPPER AIR SOUNDING UNITS

5.2.2. Non-network Stations. Low-level soundings in support of the air pollution program are taken at the five stations shown in figure 15. It is anticipated that the number of such stations will increase during the next several years. These stations take observations to 700 millibars near sunrise and around noon, Monday through Friday. During critical air pollution situations, observations are taken 7 days a week. Data for the sounding taken near sunrise are transmitted on the Service C circuit at 1408Z and relayed as necessary to get to NSSFC and AFGWC. Data for the noon soundings are transmitted as above on an unscheduled basis.

The Air Force, Navy, and Army take unscheduled observations at a number of schools, at mobile locations, and at research, development, test, and evaluation facilities. However, due to the irregular scheduling of these observations, the agencies concerned do not deem it advisable to include all of them in this Plan.

During the months of April, May, and June when the National Severe Storms Laboratory (NSSL) and other agencies are usually engaged in intensive severe local storm data collection program in central Oklahoma, upper air soundings are taken at a number of locations in support of this program. Except for the Army unit at Fort Sill, Okla., these data are processed by computer and are not available for real-time use. Data from Fort Sill are transmitted to NSSFC by means of COMET II. Such soundings are usually terminated at 400 millibars.

When special network soundings are required, they should normally be made at 18Z. The Director, NSSFC, will initiate the request to Weather Bureau and National Aeronautics and Space Administration (NASA) stations, and the Commander, AFGWC, will similarily request soundings from DOD stations. While other WBFOs have the authority to request special upper air observations during periods of potentially severe storms of all types, request for specials during periods of potentially severe local storms should be made by SELS. Any cost involved in these special soundings will be borne by the requesting agency.

5.3. Surface Weather Observational Networks.

To provide the basic weather data for the analyses performed by NSSFC and AFGWC, all available surface data are used. Surface weather observations are collected from: (1) approximately 1,286 land stations in the United States, and (2) 19 Automatic Meteorological Observing Stations (AMOS) of which seven are unattended, eight attended parttime, and four attended fulltime.

The land stations mentioned above may be placed in four general categories:

TABLE 1. NON-NETWORK UPPER AIR STATIONS WHICH MIGHT BE SOURCES OF DATA

STATION	OPERATED BY	TIME OF OBSERVATIONS	DISTRIBUTION	AGENCY CONTACT	WILL TAKE REQUESTED SPECIALS
Marshall Space Flight Center Huntsville, Ala.	NASA	*See note.	Local loop to WBO Huntsville, Ala., then to RAWARC.	Bob Turner, FTS 205-453-3109.	Yes
Navy PMR Facility San Nicolas Is., Calif.	U.S. Navy Pacific Missile Range	Monday-Friday, 00Z 12Z, 18Z; weekend and holidays, 00Z and 12Z.	00Z and 12Z, routinely on Service C; 18Z not transmitted.	Tom Carr, commercial 805-982-7173 or 8508; AUTOVON, 8-898-1750-7173 or 8508.	No. Will furnish 18Z data upon request.
Navy PMR Facility Pt. Mugu, Calif.	U.S. Navy Pacific Missile Range	Daily, 1200Z. Unscheduled frequent soundings during missions.	None	Same as above.	No. Will furnish unscheduled or 1200Z upon request.
Chico, Calif.	USAF	Monday-Friday, 15Z.	COMET II	Commander, Det. 58, 6th Wea. Wg.; AUTOVON, 831-1800 (Beale AFB), extension 2383.	No
Naval Air Technical Training Center Lakehurst, N.J.	U.S. Navy	Unscheduled.	None	Supt. of AG Schools; AUTOVON 8-481-2228.	**Yes**

*Observations are made on unscheduled basis, dependent upon operations.

TABLE 1. NON-NETWORK UPPER AIR STATIONS WHICH MIGHT BE SOURCES OF DATA (Continued)

STATION	OPERATED BY	TIME OF OBSERVATIONS	DISTRIBUTION	AGENCY CONTACT	WILL TAKE REQUESTED SPECIALS
El Centro, Calif.	USAF	Monday-Friday, to approximately 300 millibars, time variable.	COMET II	Commander, Det. 24, 6th Wea. Wg. (Edwards AFB); AUTOVON 898-1500, extension 7431.	No
Goodfellow AFB, Tex.	USAF	Unscheduled.	COMET II	Commander, or OIC, Wea. Det. 31, 6th Wea. Wg.; AUTOVON 733-3898.	Yes, during non-mission status, if personnel are available.
Edwards AFB, Calif.	USAF	Monday-Friday, daylight hours, time variable.	COMET II	Commander, Det. 24, 6th Wea. Wg.; AUTOVON 898-1500, extension 7431.	No
Cape San Blas, Fla.	USAF	Monday-Friday, 18Z.	COMET II	Commander, Det. 10, 6th Wea. Wg. (Eglin AFB); AUTOVON 899-1400, extension 883-1322.	No
White Sands Missile Range, N. Mex.	U.S. Army	Unscheduled.	COMET II	C.O. Met. Team, U.S.A. Electronics Comd.; AUTOVON 258-2211, ask for Met. Team.	No

TABLE 1. NON-NETWORK UPPER AIR STATIONS WHICH MIGHT BE SOURCES OF DATA (Continued)

STATION	OPERATED BY	TIME OF OBSERVATIONS	DISTRIBUTION	AGENCY CONTACT	WILL TAKE REQUESTED SPECIALS
Ft. Bragg, N.C.	U.S. Army	Unscheduled.	COMET II	Commander, Det. 3, 16th Wea. Sq.; AUTOVON 935-3350, ask for Wea. Facility.	No
Ft. Benning, Ga.	U.S. Army	Unscheduled.	COMET II	Commander, Det. 10, 16th Wea. Sq.; AUTOVON 431-1410, ask for Wea. Facility.	No
Ft. Sill, Okla.	U.S. Army	Unscheduled.	COMET II	Commander, Det. 11, 16th Wea. Sq.; AUTOVON 883-1400, ask for Wea. Facility.	No
Ft. Hood, Tex.	U.S. Army	Unscheduled.	COMET II	Commander, Det. 14, 16th Wea. Sq.; AUTOVON 737-2131, ask for Wea. Facility.	No
Ft. Carson, Colo.	U.S. Army	Unscheduled.	COMET II	Commander, Det. 58, 16th Wea. Sq.; AUTOVON 691-5811, ask for Wea. Facility.	No

TABLE 1. NON-NETWORK UPPER AIR STATIONS WHICH MIGHT BE SOURCES OF DATA (Continued)

STATION	OPERATED BY	TIME OF OBSERVATIONS	DISTRIBUTION	AGENCY CONTACT	WILL TAKE REQUESTED SPECIALS
Ft. Huachuca, Ariz.	U.S. Army	Unscheduled.	COMET II	C.O. Met. Team, U.S.A. Electronics, Comd.; AUTOVON 879-1110, ask for Met. Team.	No
Yuma Test Station, Ariz.	U.S. Army	Unscheduled.	COMET II	C.O. Met. Team, U.S.A. Electronics Comd.; AUTOVON 727-1450, ask for Met. Team.	No

5.3.1. Approximately 310 WBOs and AMOSs.

5.3.2. 293 FAA weather-reporting stations (FSS and Towers).

5.3.3. 494 Supplementary Aviation Weather Reporting Stations (SAWRS), including part-time, paid, and cooperative aviation and synoptic weather-reporting stations and Coast Guard facilities.

5.3.4. 189 DOD stations.

These stations take observations and transmit the coded observational data at regularly scheduled intervals. The transmissions are made hourly, even more frequently for aviation purposes, every 3 and 6 hours for synoptic map preparation, and daily for climatological purposes.

5.4. Aircraft Pilot Reports (PIREPS).

5.4.1. Federal Aviation Administration (FAA).

5.4.1.a. The present FAA regulation (91.125-IFR, radio communications, section b.) requires pilots to report...(b) Any unforecast weather conditions encountered.

5.4.1.b. The ARTCCs are requested to pass PIREPS to FSSs which are required to place them on the Area B Service Circuits (fig. 12) for distribution.

The following significant information should be included in PIREPS whenever it is observed:

(a) Moderate or greater turbulence.

(b) Hail encountered.

(c) Location of lines of thunderstorms observed on the airborne radar.

(d) Related maximum-observed cloud tops of thunderstorms.

(e) Location of tornadoes, funnel clouds, and waterspouts.

5.4.2. Airline Meteorological Offices through Aeronautical Radio Inc. (ARINC).

5.4.2.a. All pertinent PIREPS available to Chicago, Ill., or Denver, Colo., on ARINC circuits should be included in the PIREP summaries (UA) for transmission on Service A, and thus made available to NSSFC.

5.5. Severe Storm Surveillance by Meteorological Satellites.

Several types of data will be available from the various operating meteorological satellites during the 1970 severe local storm season. A description of the data and their availability are given below.

5.5.1. Automatic Picture Transmission (APT).

Pictures from the APT system on the ESSA 8 and I-TOS 1 (TIROS M) spacecraft will be available at a number of WBOs, U.S. Air Force stations, and U.S. Navy stations having appropriate ground equipment when the satellite is in range of the Office or station or from the Weather Bureau's Forecast Office Facsimile (FOFAX). At the beginning of the severe local storm season, the time of the pictures will be near 0300 and 1500 local standard time for I-TOS 1, and 0931 local standard time for ESSA 8. Pictures received directly from the spacecraft are gridded manually as soon as they are received and are available to the meteorologists almost immediately. Those received on FOFAX are gridded by computer and are available from real-time to about a 30 minutes' delay on an average. The APT cloud imagery which is transmitted over FOFAX is acquired at Wallops Island, Va., San Francisco, California, and Honolulu, Hawaii. The APT data will be available to anyone having a suitable recorder by merely obtaining a connection to the FOFAX Network.

It is important to note that I-TOS 1 provides nighttime as well as daytime coverage. Imagery at night is from the infrared (IR) channel of the scanning radiometer; during the daylight passes imagery from both APT cameras and the visible channel of the scanning radiometer will transmit in an interlaced pattern of APT-IR-APT images on an experimental basis.

5.5.2. Stored Data Images.

Stored data images will be available from ESSA 9 and I-TOS 1. ESSA 9 has an equator crossing time near 1430 local time on a northbound track. I-TOS 1 has an equator crossing time near 1500 local time on a northbound track for daylight imagery from the Advanced Vidicon Camera System (same as on ESSA 9) or from the scanning radiometer. I-TOS 1 also has nighttime stored data capability from the IR channel of its scanning radiometer during its southbound passes with an 0300 local time equator crossing. Day and night stored data coverage of the U.S. from ESSA 9 and/or I-TOS 1 normally will be available to the National Environmental Satellite Center (NESC) and the National Meteorological Center (NMC) for interpretation about 1 - 1 1/2 hours after satellite passage. Stored data imagery are computer-processed by NESC to produce digitized mosaics in map scales and projections matching commonly used weather charts. The mosaics are transmitted on all facsimile circuits.

5.5.3. Applications Technology Satellite (ATS).

The ATS program is a research and development program of NASA. Two satellites of this series, equipped with meteorological sensors, are in earth-synchronous orbit. The ATS-I satellite is located over the Central Pacific Ocean near longitude 150°W.; ATS-III was located near longitude 85°W. until March 10, but is being slowly moved to longitude 70°W. In this position, it is expected to provide suitable data for severe local storm and hurricane applications in 1970.

The Spin-Scan Cloud Camera Systems on ATS-I and III provide black and white cloud imagery of the illuminated portion of the earth encompassed by a disc about 5500 miles in diameter centered at the satellite subpoint. Arrangements have been made with NASA to obtain these cloud images in real time and relay them to the NSSFC and NHC over special-purpose circuits. High resolution photo recorders and film loop processing equipment is planned for NSSFC (by mid-April) and NHC (in June). NESC will provide photographic technician and meteorological interpreter assistance to NSSFC during the major part of the severe local storms season; this assistance will also be given to NHC during the hurricane season. During 1970, imagery will be acquired for a total of 10 hours every day from ATS-I and III combined, with emphasis on ATS-III, for example, ATS-III seven hours per day and ATS-I three hours per day. The apportionment of time to each spacecraft will depend in a large measure on the meteorological situation and needs for geostationary imagery to support the analyses, forecasts and warnings.

In addition to the special support to NSSFC and NHC, the ATS imagery will also be received and interpreted at NESC to provide the basis for satellite advisories, bulletins and direct assistance by the NESC staff.

5.6. Severe Local Storm Actions of Nonmeteorological Agencies and Individuals.

The Weather Bureau utilizes the observations of severe local storm activity, particularly tornadoes, from many nonmeteorological agencies and personnel such as: utility companies, State Highway Patrols, local Police Departments, road maintenance patrols, citizen spotters (network), cooperative Weather Bureau climatological observers, Citizen Band radio groups, local Civil Defense Organizations, radio and television station mobile units, city employees (for example, the Chicago Sanitary District), FAA, and individual citizens.

Reports are received by various means which are not uniform at each WBO, including Citizen Band or Civil Defense radio facilities (with a transceiver often located in the WBO and manned by local cooperators), police, radio direct telephone lines involving unlisted numbers, NAWAS, State Highway Patrol teletypewriter circuits by means of telephone or a sending "drop" on State EWWS circuits, and Service A teletypewriter circuits.

Reports are disseminated to mass news disseminators, other WBOs and safety agencies by the EWWS circuits (first priority, except for a more expedient means in some local areas), RAWARC, NAWAS, telephone (hot-lines and commercial), ESSA Weather Bureau's Very High Frequency-Frequency Modulation (VHF-FM) installations, direct radio broadcasts, telephone recordings, and Civil Defense radio facilities. The "fan-out" principle is utilized wherever practical.

6.0. PUBLICITY

The Air Force Global Weather Central (AFGWC) Advisories and Point Warnings are designed for specialized military users and shall not be released to the public. News media releases that concern the cooperative efforts in severe storms activities of the DOD, ESSA's Weather Bureau, and other agencies should reflect the joint nature of these efforts by giving due credit to participating agencies. Copies of these releases should be forwarded to:

Deputy Director for Operations/Environmental Services
The Joint Chiefs of Staff
Washington, D. C. 20301

Assistant Chief of Staff for Intelligence
Department of the Army
Attention: ACSI-TE
Washington, D. C. 20310

Headquarters, Naval Weather Service Command
Building 200
Washington Navy Yard
Washington, D. C. 20390

Headquarters, Air Weather Service (AWFOI)
Scott Air Force Base, Ill. 62225

ESSA, Public Information Office
6010 Executive Boulevard
Rockville, Md. 20852

COLLECTION AND DISTRIBUTION OF WEATHER BUREAU RADAR REPORTS

Weather Bureau radar information is collected and distributed on the RAWARC teletypewriter network.

The RAWARC, figure 6, is a landline teletypewriter network consisting of five circuits which terminate at Kansas City, the network relay, and monitoring station. During the hurricane season, a few stations not normally on RAWARC are also added. Traffic on RAWARC is basically unscheduled and is handled according to a priority system. The only regularly scheduled operation on RAWARC is an hourly collection (H+45) of Radar Reports (SD). Special Radar Reports can be transmitted at any time the circuit is not in use.

ANNEX 2

ESSA WEATHER WIRE SERVICE (EWWS)

The EWWS consists of (1) local loops serving metropolitan areas, (2) statewide intrastate circuits, and (3) overlay circuits. The purpose of the EWWS is to transmit consumer-oriented forecasts, watches, weather warnings, and meteorological data to the mass news media for broadcast to the public. Various specialized users also obtain drops on the EWWS to meet their requirements.

Each intrastate circuit has one Weather Bureau location designated as the State Relay Center (SRC). The SRC is also connected to the regional overlay interstate circuit and serves as the relay point for transmissions to other States through the SRCs. In each region, one Weather Bureau location has been designated as a Regional Relay Station. This Station is responsible for the relay of traffic between overlay circuits.

Only WBOs (or certain other authorized offices) have direct entry on these circuits. The WBFOs furnish broad-scale information, while local WBOs enter local information. Relays between adjacent circuits are established as necessary to meet the requirements of the Weather Bureau's Severe Local Storms Warning Service and subscribers located along State or area borders. When urgent material, such as a warning is transmitted, a prearranged bell signal is used to attract the attention of users to the transmission.

Figure 7 shows the areas covered, SRCs, regional overly circuits, and Regional Relay Centers.

AIR DEFENSE COMMAND (ADC) RADAR SITES AND ASSOCIATED DIVISION WEATHER STATIONS

1.	Baudette AFS, Minn. 48-40N. 94-37W.	23AD, Duluth, Minn.
2.	Blaine AFS, Wash. 48-55N. 122-44W.	25AD, McChord AFB, Wash.
3.	Calumet AFS, Mich. 47-22N. 88-10W.	23AD, Duluth, Minn.
4.	Cape Charles AFS, Va. 37-08N. 75-57W.	20AD, Ft. Lee AFS, Va.
5.	Charleston AFS, Maine 45-05N. 69-06W.	21AD, Hancock Field, N.Y.
6.	Fallon AFS, Nev. 39-24N. 118-43W.	26AD, Luke AFB, Ariz.
7.	Finland AFS, Minn. 47-27N. 91-14W.	23AD, Duluth, Minn.
8.	Fort Fisher AFS, N.C. 33-59N. 77-55W.	20AD, Ft. Lee AFS, Va.
9.	Fortuna AFS, N.Dak. 48-54N. 103-52W.	24AD, Malmstrom AFB, Mont.
10.	Havre AFS, Mont. 48-53N. 109-57W.	24AD, Malmstrom AFB, Mont.
11.	Keno AFS, Oreg. 42-04N. 121-58W.	25AD, McChord AFB, Wash.
12.	Mt. Laguna AFS, Calif. 32-53N. 116-25W.	26AD, Luke AFB, Ariz.
13.	North Truro AFS, Mass. 42-02N. 70-03W.	21AD, Hancock Field, N.Y.
14.	Othello AFS, Wash. 46-43N. 119-11W.	25AD, McChord AFB, Wash.
15.	Palermo AFS, N.J. 39-13N. 74-41W.	21AD, Hancock Field, N.Y.

16.	Port Austin AFS, Mich. 44-02N. 83-00W.	23AD, Duluth, Minn.
17.	Tyndall AFB, Fla. 30-05N. 85-37W.	20AD, Ft. Lee AFS, Va.

The AFGWC can contact all Division weather stations by calling the 10AF Switchboard, Richards-Gebaur AFB, Mo., and asking for the appropriate Division. After getting the desired Division, ask for 765 or 766, which will give the forecaster at all Division stations, with the exception of the 31AD, Oklahoma City AFS, Okla., whose extension is 721.

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